REPORT RESUMES

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INSTRUCTIONAL TELEVISION RESEARCH REPORTS.
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SIX EXPERIMENTAL STUDIES AND ONE SURVEY IN INSTRUCTIONAL TELEVISION ARE COMBINED AND SUMMARIZED TO SHOW AREAS FOR SUCCESSFUL APPLICATION OF TELEVISION TO THE TRAINING OF MILITARY PERSONNEL, AND AREAS REQUIRING FURTHER RESEARCH. A SUMMARY OF RESULTS SHOWS TELEVISION TO BE AS EFFECTIVE OR MORE SO THAN REGULAR INSTRUCTION. HOWEVER, HIGH INITIAL COSTS, LARGE PERSONNEL REQUIREMENTS, DIFFICULT OPERATION AND MAINTENANCE REQUIREMENTS, AND COMPLICATED PROGRAMING HAVE RESTRICTED ITS USE. IT IS RECOMMENDED THAT TELEVISION BE USED WHEN ITS UNIQUE CHARACTERISTICS MAKE ITS USE CLEARLY ADVISABLE, REGARDLESS OF COSTS AND OPERATIONAL PROBLEMS. (MS)

ED015640

INSTRUCTIONAL TELEVISION RESEARCH REPORTS

Human Engineering Report NAVTRADEVCEN 20-TV-4

Under Contract with:

U. S. Naval Training Device Center
Human Engineering Department

1 June 1956

Sponsored Jointly by Department of the Army and Department of the Navy

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Approved:

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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U. S. NAVAL TRAINING DEVICE CENTER
Human Engineering Department

Introduction

The introduction and acceptance of television has stimulated the need to discover by objective means how television can be used in military installations. The desirability of obtaining experimental evidence of the value of television for training was recognized by the U. S. Naval Training Device Center several years ago. Now a series of reports have been completed.

This volume combines and summarizes these reports to show areas for successful application of television to training and areas requiring further research. The following blue pages give a concise summary of the results. The numbers in parentheses refer to the report from which the information was derived. Reference to the specific details of the experiment will indicate the extent to which the findings are applicable.

Summary of results

1. Television has proved to be as effective or more effective than regular instruction.

2. The high initial costs, large personnel requirements, difficult operation and maintenance requirements and complicated programming have restricted its use.

Recommendation

Since television is a good instructional media it is important to discover whether it can be made acceptable and compete effectively with other instructional media. This can be done by considering its cost, effectiveness, personnel requirements, programming requirements and its acceptance by all persons involved. Television systems employing a minimum of equipment and personnel should most nearly meet these requirements. Television should be used in those other instances where the unique characteristics of television make its use clearly advisable regardless of costs and operational problems.

Loran C. Twyford, Jr., Ph.D.
Acting Head, Communication Psychology Division

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SUMMARY OF INSTRUCTIONAL TELEVISION RESEARCH REPORTS

A. LIVE INSTRUCTIONAL TELEVISION FOR THE CLASSROOM

1. Effectiveness A television program can be at least as effective as comparable means of instruction (476-02-S2, 476-02-S3).

2. Acceptance Television instruction is well liked (476-02-S2, 530-01-1). Well prepared programs were highly acceptable after an eight week period of television training (476-02-S3).

3. Mass Training Television is a feasible and effective means for instructing widely separated groups (476-02-S2, 476-02-S3).

4. Principal Problems (476-02-S2)

    a. Procurement and training of personnel for planning and producing television lessons.

    b. Procurement of television equipment and personnel to maintain it.

5. Retention of Learning Most learned material was retained over a six week period (476-02-S3).

6. Level of Instruction All grades of personnel learned from television programs (476-02-S3).

7. Novelty Effect In 1950 trainees said that the television instruction they received was more effective than the average training film. This instruction was carefully prepared, skillfully presented and the trainees tried to learn (476-02-S3).

8. Effective Presentations Items that were explicitly covered were well learned. Sketchily treated items were not learned (476-02-S3).

9. Dramatic or Factual Learning occurred when specific information was presented. Little learning occurred from dramatic or situational presentations (476-02-S3).

10. Introductions Speeches by high-ranking officials were with few exceptions too long, quite boring, poorly reproduced and detracted from the instructional value of the programs (476-02-S3).

11. Screen Size Twelve to twenty inch television screens were said to be adequate by trainees (476-02-S3).

12. Applicability A criteria check list has been developed to determine courses of instruction which are suited for television instruction (530-01-1).

13. Single Camera One television camera will fulfill most military training needs but for reliability and flexibility, two cameras are more desirable (530-01-1).

14. Instructors Qualified instructors can be trained to teach by television in a relatively short time (530-01-1).

15. Minimum Equipment Television Experience has indicated that a minimum of equipment gives the greatest training per dollar expended for televising (530-01-1).

16. Courses Effective television training has been carried out in large number of subject areas (530-01-1).

17. Films Films are effective on television (530-01-1, 476-02-S2, 476-02-S3).

18. Television Recordings (kinescopes) Film recordings of television programs are a valuable by-product (530-01-1, 20-TV-1, 476-02-S2).

19. Mobile Television A mobile television studio and associated equipment can be used to present and record television programs.

B. FILM RECORDINGS OF TELEVISION PROGRAMS

1. Effectiveness Film recordings of television programs (kinescopes) are very satisfactory for military training even though picture quality may be poor (20-TV-1, 476-02-S2).

2. Use Kinescope recordings were recommended for training instructors, duplicating lessons, disseminating new developments and as a substitute for instructional films (530-01-1).

3. Color Color, unless it is essential to the subject being taught, does not increase the effectiveness of television training (20-TV-1).

C. SPECIALIZED TELEVISION APPLICATIONS

1. Training Device Viewing Training devices may be televised to a larger group than can normally see them (530-01-1). Thirty-one principles for improving visibility have been discovered (20-TV-2).

2. Security Applications Television signals containing classified information can be transmitted to the classroom over a closed circuit cable (476-02-S3).

3. Critical Factors Television expense and labor can be more easily justified when the training situation is dangerous or mass training is essential (530-01-1).

D. INCIDENTIAL TELEVISION INSTRUCTION (Audience may or may not watch)

1. Dramatizations Dramatic treatments brought about less learning than other types of treatment (476-02-S2).

2. Attitudes Polls have shown a definite acceptance by civilians of programs dealing with book reviews, social problems, history, lectures, etc. (530-01-1).

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SDC 476-02-S3	A Study of Learning and Retention From Television Instruction Transmitted to Army Field Force Reservists
SDC 20-TV-1	Learning From Kinescopes and Films
SDC 269-7-42	Relative Effectiveness of Verbal Introductions to Kinescope Recordings and Training Films
SDC 20-TV-2	Visual Principles for Training by Television
SDC 269-7-38	Evaluation of Two Kinescopes

II. Surveys

SDC 530-01-1	Survey of Television Utilization in Army Training
	Fundamentals of Training by Television

TECHNICAL REPORT - SDC 476-02-S2

THE EFFECTIVENESS OF TELEVISION INSTRUCTION IN TRAINING NAVAL AIR RESERVISTS

(Rapid Mass Learning)

Fordham University
Television Evaluation Project
April 1951

Project Designation NR 781-007
Contract N7onr-47602
SDC Human Engineering Project 20-E-5a

FINAL PROJECT REPORT

Prepared by

Robert T. Rock, Jr.
James S. Duva
John E. Murray

TELEVISION EVALUATION PROJECT

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New York 58, New York

Directed by
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INTRODUCTION

This technical supplement to Report NAVEXOS 850-2 presents in more detail the findings summarized in that report. It is concerned with an experimental determination of the effectiveness of television training compared with other forms of training for Naval Air Reservists. The work herein reported was conducted under Contract N7onr-47602, and represents one phase of a pioneering study of training by television conducted at the Special Devices Center over the period October 1948 to February 1951.

ACKNOWLEDGMENTS

It is desired to acknowledge the generous cooperation of the National Broadcasting Company and of the Philco Corporation in making possible the network transmission of the television lessons which originated in the television studio of the Special Devices Center. It is also desired to express appreciation to the many naval officers who assisted in the Project. Special thanks are due to Commander G. W. Glenn, Aviation Technical Training Officer on the Staff of the Chief of Naval Air Reserve Training, and to Lieutenant Commander G. W. Anderson, Assistant for Technical and Ground Training, Air Reserve Training Section of the Aviation Training Branch, Office of the Chief of Naval Operations.

QUESTIONS TO BE ANSWERED

This study was undertaken to obtain answers to the following questions:

(1) Can television be used effectively for conveying information to widely separated groups?

(2) Do groups receiving instruction by television learn as much as groups given traditional classroom instruction?

(3) Is television instruction favorably received by reservists?

(4) Are recordings of instructional telecasts effective when later projected as sound moving pictures?

(5) What problems would be encountered in using television for rapid, mass training?

DESIGN OF THE EXPERIMENT

The basic design of the experiment involved the following steps, as outlined in Figure 1:

(1) Selecting topics for instruction: eight were designed for refresher training of officer pilots, and eight for basic training of enlisted airmen.

(2) Developing a lesson plan for each of these topics.

(3) Preparing tests for administration before and after each instructional session, using the lesson plans as a guide.

(4) Preparing television instructional sessions based on the lesson plans.

(5) Broadcasting television presentations to groups of Naval Air Reservists in classrooms at three Naval Air Training Stations.

(6) Preparing kinescope recordings of the television programs as they were being broadcast, and presenting copies of these recordings as sound movies to groups of reservists in classrooms at three additional Naval Air Training Stations.

(7) Submitting the lesson plans from which the television scripts had been developed to local instructors at three other Naval Air Training Stations, for their use in preparing instruction on the designated topics. Instructors presented lessons to reservists at their own stations.

(8) Administering tests based on the lesson plans to all groups immediately before and immediately after instruction.

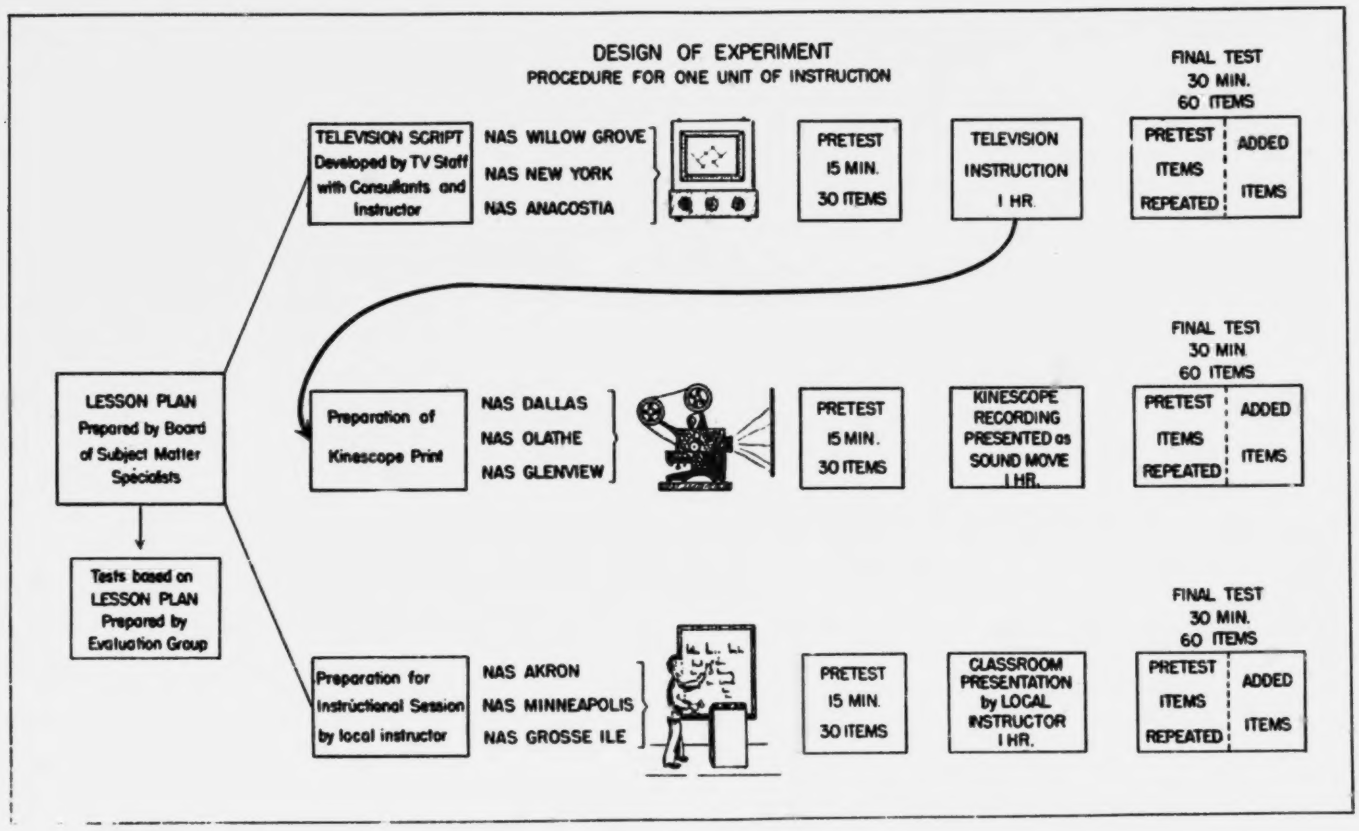

DESIGN OF EXPERIMENT
PROCEDURE FOR ONE UNIT OF INSTRUCTION
LESSON PLAN Prepared by Board of Subject Matter Specialists
Tests based on LESSON PLAN Prepared by Evaluation Group
TELEVISION SCRIPT Developed by TV Staff with Consultants and Instructor
NAS WILLOW GROVE
NAS NEW YORK
NAS ANACOSTIA
PRETEST 15 MIN. 30 ITEMS
TELEVISION INSTRUCTION 1 HR.
FINAL TEST 30 MIN. 60 ITEMS
PRETEST ITEMS REPEATED
ADDED ITEMS
Preparation of Kinescope Print
NAS DALLAS
NAS OLATHE
NAS GLENVIEW
PRETEST 15 MIN. 30 ITEMS
KINESCOPE RECORDING PRESENTED as SOUND MOVIE 1 HR.
FINAL TEST 30 MIN. 60 ITEMS
PRETEST ITEMS REPEATED
ADDED ITEMS
Preparation for Instructional Session by local instructor
NAS AKRON
NAS MINNEAPOLIS
NAS GROSSE ILE
PRETEST 15 MIN. 30 ITEMS
CLASSROOM PRESENTATION by LOCAL INSTRUCTOR 1 HR.
FINAL TEST 30 MIN. 60 ITEMS
PRETEST ITEMS REPEATED
ADDED ITEMS

Figure 1

NAR TECHNICAL TRAINING OFFICER ADVISORY BOARD

A Naval Advisory Board was established to insure that the television training programs would comply with the training requirements of the Chief, Naval Air Reserve Training. This group consisted of:

Lt. Cdr. Frank Adams; Alternate, Lt. Cdr. Joseph Rowland, Naval Air Station, New York, N.Y.

Lt. Cdr. Patrick J. Finneran; Alternate, Lt. Cdr. Howard Payne, Naval Air Station, Anacostia, D.C.

Lt. Cdr. Dean Rumbold, Naval Air Station, Willow Grove, Pa.

Lt. William Sparks; Alternate, Lt. (jg) T.E. Glass, Naval Air Station, Squantum, Mass.

This advisory group was designed to function as follows: (a) Plan topics to be treated in the series of Naval Air Reserve training programs. (b) Designate the material to be presented in each television program. This information was then to be submitted to lesson plan writers (Lewis Merkel, A/E-2 and Lt. Cdr. Bert Shields). (c) Review the completed lesson plans and indicate any changes required to ensure adherence to CNAResTra requirements. After revision, the lesson plans would be turned over to script writers who were to prepare the television scenarios.

In addition to the above functions, the Naval Advisory Board was to suggest for the various programs likely instructors from their home stations who would be screened for suitability; arrange classroom space for reservists viewing the programs; and set aside suitable periods in the training schedule for pre- and post-testing the subject matter of each telecast.

SUBJECTS

The subjects were officer pilots and enlisted airmen of the Naval Air Reserve. As part of their regular training sessions, these men were assigned to participate in the experimental sessions. Trainees at Willow Grove, Pennsylvania; Floyd Bennett, New York; and Anacostia, Washington, D. C., received instruction by television. Trainees at Dallas, Texas; Olathe, Kansas; and Glenview, Illinois, received instruction by means of the television recording (kinescope). Trainees at Akron, Ohio; Minneapolis, Minnesota; and Grosse Ile, Michigan, were taught by local instructors. At each station, approximately 40 men participated in each lesson; consequently, data are available on each lesson for 100 to 120 men taught by television, 100 to 120 taught by kinescope, and a like number taught by local instructors. The exact number of trainees from whom complete records were obtained is reported in Table 1.

TABLE 1

OFFICERS

NUMBER OF TRAINEES FROM WHOM COMPLETE RECORDS WERE OBTAINED FOR EACH LESSON, AND EACH TYPE OF INSTRUCTION

TITLE OF LESSON	GROUP	NUMBER PARTICIPATING
Civil Air Regulations	Television	119
	Kinescope	116
	Local Instructor	110
Aerology I	Television	93
	Kinescope	120
	Local Instructor	120
Aerology II	Television	128
	Kinescope	120
	Local Instructor	115
Navigation Review	Television	113
	Kinescope	111
	Local Instructor	114
Radio Aids to Navigation	Television	129
	Kinescope	119
	Local Instructor	120
Engineering	Television	66
	Kinescope	101
	Local Instructor	120
High Altitude Flying	Television	100
	Kinescope	101
	Local Instructor	120
Cross Country Flight	Television	108
	Kinescope	115
	Local Instructor	116

TABLE 1 (Cont)

ENLISTED AIRMEN

NUMBER OF TRAINEES FROM WHOM COMPLETE RECORDS WERE OBTAINED FOR EACH LESSON, AND EACH TYPE OF INSTRUCTION

TITLE OF LESSON	GROUP	NUMBER PARTICIPATING
Theory of Flight	Television	121
	Kinescope	120
	Local Instructor	113
Line Safety	Television	122
	Kinescope	120
	Local Instructor	115
Line Servicing	Television	118
	Kinescope	115
	Local Instructor	118
Ordnance and Gunnery	Television	119
	Kinescope	111
	Local Instructor	119
Weights and Balances	Television	124
	Kinescope	120
	Local Instructor	120
Squadron Organization	Television	123
	Kinescope	112
	Local Instructor	117
Survival and Safety	Television	70
	Kinescope	119
	Local Instructor	120
Jet Engines	Television	123
	Kinescope	108
	Local Instructor	114

Attrition due to failure to complete tests or to sign booklets was extremely low — amounting to only six-tenths of one per cent of the number of subjects participating in the experiment.

At each station, different personnel participated in the successive lessons because of training schedules which called for training duty only once a month. Because of wide geographical scatter and the continually changing personnel, no procedures for selecting subjects in advance of the experimental sessions were feasible.

The nine stations participating in the experiment were selected upon recommendation by the Naval Advisory Board. Each station had a well-developed reserve training program, and it was anticipated by the advisory group that trainees at all of these stations would be at approximately the same stage of training. Tests given immediately before the experimental sessions showed that the groups subjected to the three instructional procedures earned mean scores which were, on the whole, quite comparable. Such initial inequalities in knowledge as were found between instructional type groups were compensated for by appropriate statistical procedures (analysis of co-variance technique).

INSTRUCTORS

Instructors for the television sessions were selected from personnel at Floyd Bennett, Willow Grove, and Anacostia Naval Air Training Stations or attached to the Special Devices Center. Officers gave instruction to the pilots, and Chief Petty Officers or technicians instructed the enlisted airmen. Within each group of instructors there was considerable variation in the amount of teaching experience and in the degree of mastery of the subject matter taught. However, as a result of the search for outstanding instructors, the average instructor appearing on the television programs probably had been more successful as a teacher and knew more about his specialty then would the average instructor in the usual teaching situation at a Naval Air Training Station.

Classroom instruction at Akron, Minneapolis, and Grosse Ile Naval Air Training Stations was given by local instructors. The Commanding Officer and the Technical Training Officer at each of these stations was aware that comparisons were to be made between the outcomes of teaching by their personnel and television instruction. Consequently, it is highly probable that the local instructors were at least as carefully selected (and perhaps more carefully) for the experimental teaching assignments as they would have been for normal teaching assignments.

LESSONS TAUGHT

The following is a complete list of the programs presented and the length of the instruction period for each.

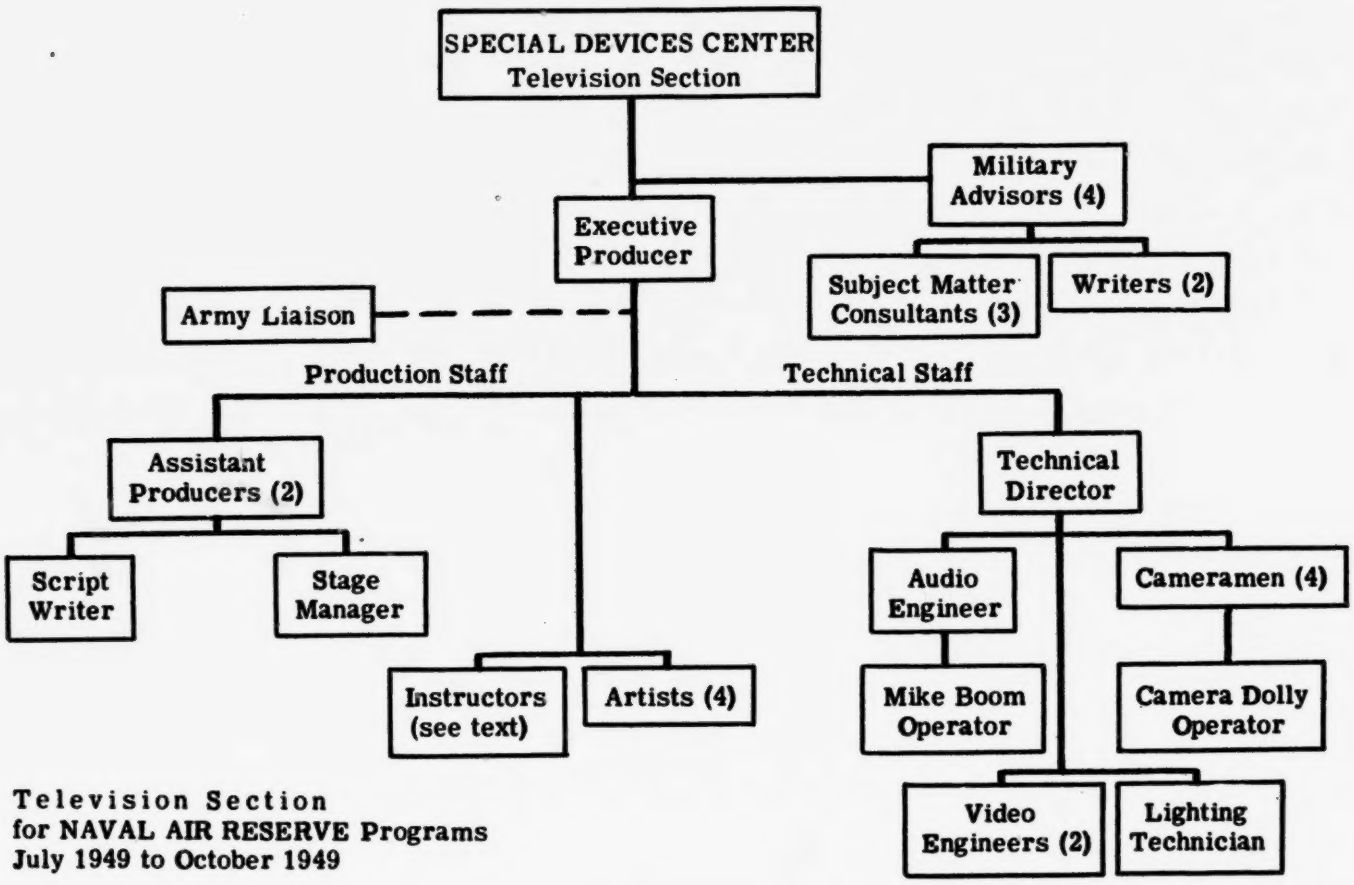
PROGRAM	LENGTH OF INSTRUCTION PERIOD
Refresher Training for Officers	
1. Civil Air Regulations: Procedures under instrument flight rules and visual flight rules	45 minutes
2. Aerology I: Theory of weather changes affecting flight	1 hour
3. Aerology II: Interpretation of weather maps and teletype weather sequence reports	1 hour
4. Navigation Review: Planning and plotting a flight	1 hour
5. Radio Aids to Navigation: Recent developments in radio ranges, direction finding, and landing systems	1 hour
6. Engineering: Pre-flight check, technical orders, and proper loading of aircraft	1 hour
7. High Altitude Flying: Training for safety and survival of the pilot at high altitudes	1 hour
8. Cross Country Flight: A simulated flight under marginal weather conditions	1 hour
Basic Training for Enlisted Airmen	
1. Theory of Flight: Elementary aerodynamics	45 minutes
2. Line Safety, Aircraft Handling, and Pre-Flight Check	1 hour
3. Line Servicing: Fueling and securing of aircraft	1 hour
4. Ordnance and Gunnery: Small arms and range procedure; flexible and fixed aerial gunnery	1 hour
5a. Weights and Balances: The optimal loading of aircraft	40 minutes
5b. Squadron Organization: Types of squadrons and typical ratings in a sample squadron organization	20 minutes
6. Survival and Safety: Use of life raft, emergency signalling equipment, etc., following ditching aircraft at sea	1 hour
7. Jet Engines: Fundamental principles of the structure and operation of jet engines	1 hour

8. Nuclear Physics: A theoretical discussion of recent developments in atomic physics. No lesson plan was made available for use in preparing tests for this lesson; consequently, this session was not formally evaluated. It was presented only to the television group. 1 hour

LESSON PLANS

Lesson plans for each subject except the one on "Nuclear Physics" were prepared by a group of naval officers assigned to cooperate in planning the instruction. These lesson plans included references to appropriate publications which would be helpful in preparing the instruction. A list of available films and other training aids was also included in each lesson plan.

The "Nuclear Physics" session was planned and presented by Dr. Clark Goodman of the Massachusetts Institute of Technology, but no lesson plan was made available for use in preparing tests; consequently, this session was not formally evaluated.


SPECIAL DEVICES CENTER
Television Section
Military Advisors (4)
Executive Producer
Subject Matter Consultants (3)
Writers (2)
Army Liaison
Production Staff
Technical Staff
Assistant Producers (2)
Technical Director
Script Writer
Stage Manager
Audio Engineer
Cameramen (4)
Instructors (see text)
Artists (4)
Mike Boom Operator
Camera Dolly Operator
Video Engineers (2)
Lighting Technician

Television Section
for NAVAL AIR RESERVE Programs
July 1949 to October 1949

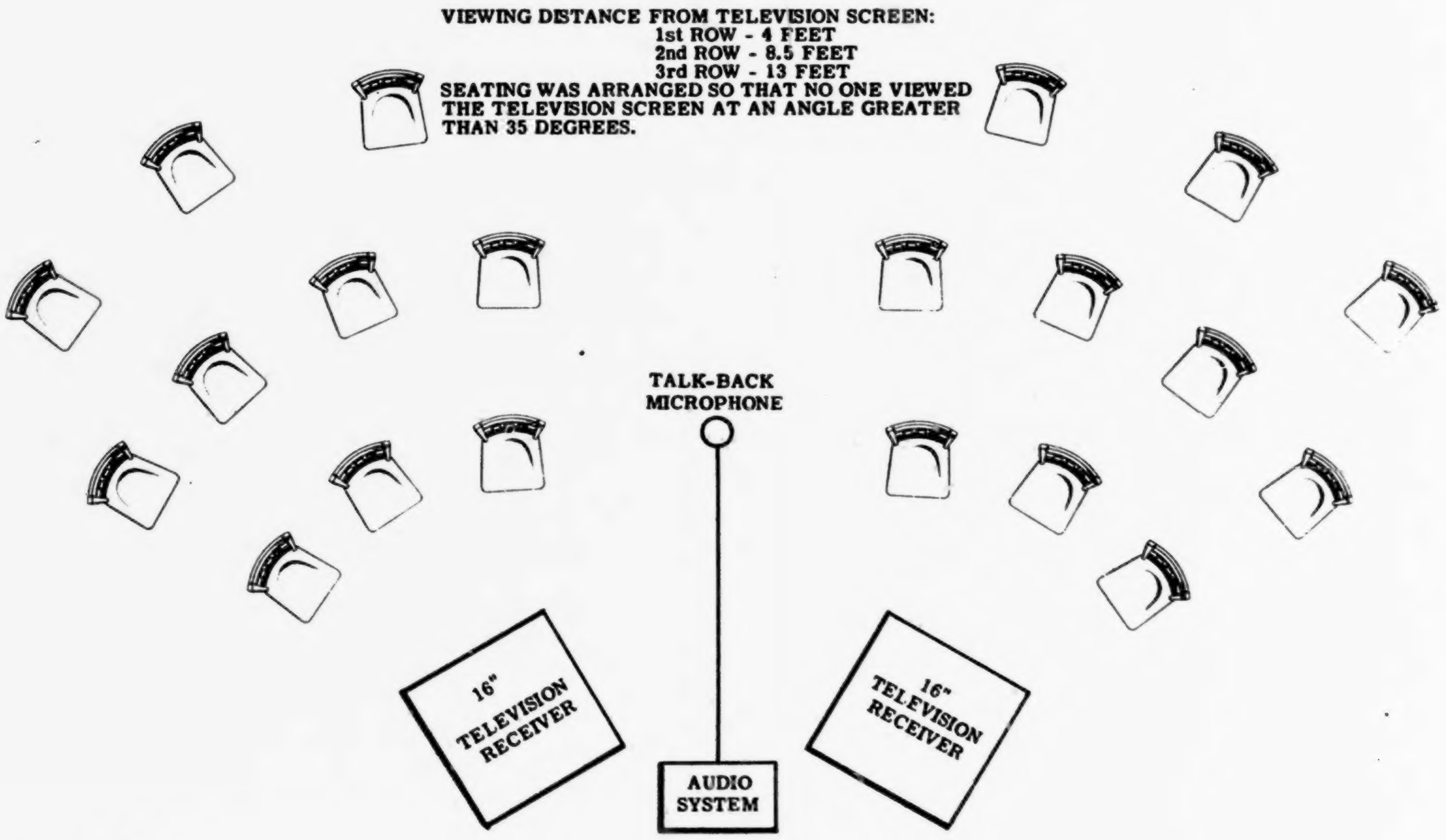
Figure 2
ORGANIZATION CHART

PRODUCTION OF TELEVISION SESSIONS

Programs originated in the television studio of the Special Devices Center and were produced and directed by personnel of the Television Section of the Special Devices Center. The Evaluation Group played no part in the production of the instructional sessions, and operated independently of the Television Section. Figure 2 presents an organization chart for the Television Section.

VIEWING CONDITIONS IN TELEVISION CLASSROOMS

Sixteen-inch television receivers were used, two to a classroom, and ten men were assigned to each receiver. The seating arrangement is shown in Figure 3. Microphones connected to telephone circuits made it possible for trainees to present questions at stated periods to the television instructor.



VIEWING DISTANCE FROM TELEVISION SCREEN:
1st ROW - 4 FEET
2nd ROW - 8.5 FEET
3rd ROW - 13 FEET
SEATING WAS ARRANGED SO THAT NO ONE VIEWED THE TELEVISION SCREEN AT AN ANGLE GREATER THAN 35 DEGREES.

Figure 3
DIAGRAM OF SEATING ARRANGEMENT

EVALUATION PROCEDURES

1. Tests. From each lesson plan, multiple choice questions were prepared. Samples of items are given below.

Aerology II

When a pilot sees a thunderstorm while in flight, there are several facts he should use in judging the direction in which it is moving. One of these is that

1. the anvil and "shelves" protrude farthest ahead of the storm.
2. in the United States, the storm generally moves in a direction opposite to that of the gradient wind.
3. the roll cloud usually develops in the rear of the storm cloud.
4. horizontal lightning streaks occur chiefly in the front portions of thunderstorms, with vertical streaks in the rear portions.

Cross-Country Flight

Normally, upon closing a VFR flight plan from a non-military base, a new flight plan may be filed at the same time only if the pilot

1. intends to depart within the hour.
2. plans to clear for a military base.
3. intends to continue under VFR.
4. notifies CAA.

High Altitude Flying

The purpose of breathing pure oxygen prior to flight is principally to

1. acclimate the pilot to the peculiarities of oxygen breathing.
2. prevent nitrogen bubble formation.
3. test the adequacies of the equipment.
4. increase rate of blood circulation thereby facilitating oxygen transport to the tissues.

Survival and Safety

The Navy type multiplace raft should be boarded from

1. the front.
2. the rear.
3. either front or rear.
4. either side.

Line Safety

Pre-flighting a plane means

1. a quick check of fuel and engine.
2. a routine check before each flight.
3. a detailed daily check on each plane.
4. loading the plane for flight.

Jet Engines

The fuel nozzles in the combustion chamber of a jet engine are arranged in rings to

1. cool the fuel.
2. distribute the fuel evenly in the combustion chamber.
3. save space.
4. prevent forward burning into the compressor.

From the pool of items prepared for a particular lesson, approximately thirty items were selected to make up a pretest to be given before the instruction. All of the items in the pretest were repeated in the final test, and they were supplemented by an equal number of additional items selected to sample similarly the lesson plan content. The time limit for the pretests was fifteen minutes, while thirty minutes were allowed for the final tests. These time limits permitted almost all reservists to attempt all items, hence the tests were measures of power rather than of speed. The pretest was given immediately before the instructional session, and the final test was given immediately after it. This denied the trainees any opportunity to discuss the test items or program content among themselves before taking the final test.

Because of the short period of time available for preparing items, it was not possible to try out tests in advance and to refine them by item analysis. The appropriate difficulty level of items had to be established by the opinions of experts.

Before the instructional period, the mean percentage of correct responses on the various pretests earned by the approximately 350 officers in the Television, Kinescope, and Local Instructor groups combined, ranged from 41.9 to 58.8 and centered about 49.1. There were no zero scores, but one or two officers approached perfect scores on some of the pretests before instruction. It must be borne in mind that the officer programs were intended to constitute "refresher" training rather than instruction in new areas. After instruction, the mean percentages of correct responses on the final tests ranged from 57.8 to 65.1, and averaged 61.7.

Mean percentages of correct responses on the various pretests earned before instruction by the approximately 350 enlisted airmen in the Television, Kinescope, and Local Instructor groups averaged 46.1 and ranged from 36.6 to 55.3. There were no zero scores, but there were many low scores. After instruction, the mean percentages of correct responses on the various final tests ranged from 52.8 to 78.0 and centered about 69.0. A few individuals approached perfect scores on several of the tests.

Estimated reliability coefficients for each of the final tests were obtained by computing the correlation between scores on split-halves of each test for the Television group and applying the Spearman-Brown formula. For the officer final tests, the reliability coefficients ranged from .51 to .79. The reliability coefficients for the enlisted airmen final tests varied from .65 to .82. All reliability coefficients are reported in Table 14, in Appendix A. The estimated reliability coefficients of the tests are lower than would be considered desirable for individual prognosis, but the tests yield sufficiently stable measures for making comparisons between groups.

Scoring of Tests. Incomplete test papers were discarded, and tests were scored only if a complete pretest could be matched with a complete final test for the same individual. Only six-tenths of one per cent of the papers marked were discarded for incompleteness. From scoring keys prepared with the aid of the Naval Advisory Board, tests were scored and independently rescored. The score on each test was the number of correctly marked items.

Test Administration in the television classrooms was supervised by members of the Evaluation Project staff. Tests for other groups were supervised by local training officers. Prior to the first lesson at each station, a member of the Project staff conferred with the training officer and emphasized the necessity for safeguarding the tests and adhering closely to instructions. Excellent cooperation was secured and inspection visits showed seals on test envelopes unbroken up to the time they were to be used.

2. Procedure for Comparing Types of Instruction. To permit a comparison of the learning outcomes of television instruction with the learning effected by the usual type of reserve training, the prepared lesson plans were sent to three additional Naval Air Training Stations (Akron, Minneapolis, and Grosse Ile) with a directive specifying that local instructors be assigned to teach the topics covered by the sixteen lesson plans to groups similar to the groups participating in the television phase. The time allowance

for each topic was the same as that used in telecasting. Local instructors were advised that the learning accomplished by their classes would be compared with the learning accomplished by students receiving television instruction. It is likely, therefore, that each local instructor exerted at least as much time and effort (and perhaps more) in preparing his presentation as he would expend on an average lesson. Students taught by the local instructors were also informed that they were participating in an experimental comparison between traditional instruction and television instruction. Pretests and final tests, identical with those used with the television classes, were administered before and after each lesson.

Recordings were made of each program as it was being telecast. Prints of these kinescope recordings were sent to another group of three Naval Air Training Stations (Dallas, Olathe, Glenview) with instructions that they be projected as sound movies for comparable groups of reservists during their regular training periods. The trainees were aware that they were viewing kinescope recordings of television programs, because the prints included opening and closing station announcements. They were also told that they were participating in an experimental comparison of kinescope instruction and television instruction. The same pretests and final tests given to the other groups were administered to these trainees.

3. Other Evaluative Evidence for the Television Programs. In addition to test data, three other types of information regarding the television instructional sessions were gathered.

Comments by Students. At the conclusion of each television lesson, trainees were invited to write in their test booklets any comments, favorable or unfavorable, they desired to make regarding the program just viewed.

Comments by Staff of Evaluation Project and by Naval Advisory Board. One or more staff members of the Evaluation Project viewed each session of television instruction as it was received in the television classrooms at Floyd Bennett, Willow Grove, and Anacostia Naval Air Stations. Viewing conditions were systematically observed and recorded. Observations were also made of the apparent reaction of the viewing groups to the programs.

Following completion of the series of television lessons, the Naval Advisory Board met with the staff of the Evaluation Project, and the programs were systematically discussed from the point of view of their adequacy as reserve training sessions.

Analysis of Program Content. From the kinescope recordings, the types and amounts of instructional and non-instructional activities included in each television program were determined.

TREATMENT OF RESULTS

1. Test data. To compare the learning accomplished by the three types of instruction, two measures were used. The first of these compared the improvement in score when the pretest items were repeated immediately after instruction. This measure was advantageous because it was based on identical tests given just before and immediately after instructional sessions.

The second measure of the effectiveness of the three instructional procedures was based on a comparison of relative status on the double-length final tests, with statistical adjustment for such inequalities in knowledge as were found among groups before instruction. The advantage of this index is its more extensive, hence, more reliable, sampling of knowledge of the subject matter included in the various lesson plans.

For the eight officer programs, there were consequently sixteen comparisons to be made between the outcomes of television instruction and teaching by local instructor; sixteen comparisons to be made between the effectiveness of teaching by local instructor and by kinescope instruction; and, finally, sixteen comparisons between the outcomes of television instruction and kinescope instruction.

For the eight topics taught to the enlisted men, only fifteen comparisons were possible between each pair of instructional procedures, since the pretest and final test for the brief "Squadron Organization" lesson were identical.

2. Comments by Trainees. From 36 per cent to 73 per cent of the officers and from 44 per cent to 65 per cent of the enlisted airmen participating in each television lesson wrote some comment in the test booklets. Remarks of individuals varied from a few lines to rather lengthy statements. Remarks were transcribed verbatim from the booklets and aggregated 83 pages of single-spaced typewritten material. After a careful reading of the comments, tentative categories were adopted for tabulating the frequency of recurring remarks. Following several revisions of these categories, it was found possible to tabulate substantially all of the pertinent comments in 24 categories. The broad headings under which these categories were developed dealt with the following:

a. Subject matter and organization of material

b. Adequacy of television reception and classroom conditions

c. Instructors

d. Tests

3. Comments by Staff of Evaluation Project and by Naval Advisory Board. Reports on the adequacy of video and audio reception made by staff members of the Evaluation Project in each classroom for each program were studied to determine whether reception of television instruction in any classroom had been seriously affected by transmission or reception difficulties. Such technical deficiencies as were reported were minor in character, and no television class had to be eliminated from consideration because of poor reception.

Discussions of the television lessons by the Naval Advisory Board were summarized by staff members of the Evaluation Project. One type of summary related to the specific programs, and a second consisted of recommendations applicable to future television instruction.

4. Analysis of Program Content. A preliminary analysis of the television recordings revealed that a minimum of 15 categories was required to describe adequately the types of activities included in the various programs. The percentage of program time devoted to each of these 15 categories was computed. The more effective and less effective television programs were compared to determine whether large or small amounts of specified activities characterized good or poor programs.

RESULTS

1. TEST RESULTS. Tables 15 to 30, in Appendix B, present the differences between mean adjusted scores on pretests repeated after instruction and also differences between final test mean adjusted scores for (a) the television group compared with the local instructor group, (b) the television group compared with the kinescope group, and (c) the kinescope group compared with the local instructor group. Each of the differences reported in these tables is accompanied by the standard error of the difference, the t-ratio of the difference compared to its standard error, and a verbal interpretation of the significance of the difference between means.

Table 2 summarizes the interpretations of the significance of differences between specified officer groups on pretest items repeated after instruction, with adjustment

TABLE 2

SUMMARY OF INTERPRETATIONS OF DIFFERENCES BETWEEN SPECIFIED OFFICER GROUPS ON PRETEST ITEMS REPEATED AFTER INSTRUCTION, WITH ADJUSTMENT FOR INITIAL INEQUALITIES

Title of Session	Television Compared to Local Instructor (LI)	Television Compared to Kinescope (K)	Kinescope Compared to Local Instructor
1. Civil Air Regulations	Equivalent	Equivalent	Equivalent
2. Aerology I	LI superior	Equivalent	LI superior
3. Aerology II	TV superior	Equivalent	K superior
4. Navigation Review	TV superior	Equivalent	Equivalent
5. Radio Aids to Navigation	TV superior	Equivalent	K superior
6. Engineering	Equivalent	Equivalent	LI superior
7. High Altitude Flying	TV superior	Equivalent	K superior
8. Cross Country Flight	Equivalent	Equivalent	Equivalent

NUMBER OF COMPARISONS INDICATING SPECIFIED CONCLUSIONS

TV superior to Local Instructor	4
TV equivalent to Local Instructor	3
TV inferior to Local Instructor	1

TV superior to Kinescope	0
TV equivalent to Kinescope	8
TV inferior to Kinescope	0

Kinescope superior to Local Instructor	3
Kinescope equivalent to Local Instructor	3
Kinescope inferior to Local Instructor	2

(by means of the analysis of co-variance technique) for such initial inequalities as were found. Table 3 summarizes the interpretations of differences between final test mean scores of the various officer groups after adjustment for initial inequalities. Tables 4 and 5 present corresponding summaries of the interpretations of differences between specified enlisted airmen groups.

In comparing the outcomes of two instructional procedures, if the difference in mean adjusted scores was so small that it might be expected to occur by chance more than five times in 100 repetitions of the experiment, the difference was indicated as insignificant and the two procedures were judged, for the given instance, as equivalent in effectiveness. A difference was considered significant only if the statistical analysis indicated that such a difference might be caused by chance factors two or fewer times in 100 repetitions of the experiment. Where such significant differences between the effects of instructional procedures were found (two per cent level of confidence, or more reliable), the procedure associated with the higher mean score was judged to be more effective, or superior to, the other procedure. The interpretation, "probably significant," was attached to those differences which did not reach the two per cent level of confidence, but which were clearly above the five per cent confidence level.

Compensation for such initial inequalities between groups as were found, was accomplished by utilizing the analysis of co-variance technique. In order to place all comparisons on the same basis, the co-variance technique was applied even in those instances where groups did not differ significantly in initial status.

Figures 4 to 19, in Appendix C, present graphically the following scores for each group for each lesson:

a. The mean pretest score.

b. The obtained (that is, unadjusted) mean score on pretest items repeated after instruction.

c. The mean obtained score on final test.

A statistically sophisticated inspection of the mean obtained scores as represented in these graphs would lead to substantially similar over-all conclusions regarding the relative effectiveness of the three instructional procedures as were obtained from the more refined statistical analyses reported herein.

Results from the pretest items repeated after instruction and from the complete final test were in harmony with each other. In no instance was an indication of superiority or inferiority for one of two instructional procedures yielded by data from pretests repeated after instruction contradicted by a reverse finding from the data for the complete final test. There were, of course, instances where a significant

TABLE 3

SUMMARY OF INTERPRETATIONS OF DIFFERENCES BETWEEN MEAN FINAL TEST SCORES OF SPECIFIED OFFICER GROUPS, WITH ADJUSTMENT FOR INITIAL INEQUALITIES

Title of Session	Television Compared to Local Instructor (LI)	Television Compared to Kinescope (K)	Kinescope Compared to Local Instructor
1. Civil Air Regulations	Equivalent	TV probably superior	Equivalent
2. Aerology I	Equivalent	Equivalent	Equivalent
3. Aerology II	TV superior	Equivalent	K superior
4. Navigation Review	Equivalent	Equivalent	Equivalent
5. Radio Aids to Navigation	TV superior	Equivalent	K superior
6. Engineering	LI superior	Equivalent	LI superior
7. High Altitude Flying	TV superior	Equivalent	K superior
3. Cross Country Flight	TV superior	Equivalent	Equivalent

NUMBER OF COMPARISONS INDICATING SPECIFIED CONCLUSIONS

TV superior to Local Instructor	4
TV equivalent to Local Instructor	3
TV inferior to Local Instructor	1

TV superior to Kinescope	1
TV equivalent to Kinescope	7
TV inferior to Kinescope	0

Kinescope superior to Local Instructor	3
Kinescope equivalent to Local Instructor	4
Kinescope inferior to Local Instructor	1

TABLE 4

SUMMARY OF INTERPRETATIONS OF DIFFERENCES BETWEEN SPECIFIED ENLISTED AIRMEN GROUPS ON PRETEST ITEMS REPEATED AFTER INSTRUCTION, WITH ADJUSTMENT FOR INITIAL INEQUALITIES

Title of Session	Television Compared to Local Instructor (LI)	Television Compared to Kinescope (K)	Kinescope Compared to Local Instructor
1. Theory of Flight	Equivalent	Equivalent	Equivalent
2. Line Safety	LI superior	TV probably superior	LI superior
3. Line Servicing	LI superior	Equivalent	LI superior
4. Ordnance and Gunnery	TV superior	Equivalent	K superior
5a Weights and Balances	TV superior	Equivalent	K superior
5b Squadron Organization	TV superior	TV superior	Equivalent
6. Survival and Safety	TV superior	Equivalent	K superior
7. Jet Engines	TV superior	Equivalent	K superior
8. Nuclear Physics	——*	——*	——*

NUMBER OF COMPARISONS INDICATING SPECIFIED CONCLUSIONS

TV superior to Local Instructor	5
TV equivalent to Local instructor	1
TV inferior to Local Instructor	2

TV superior to Kinescope	2
TV equivalent to Kinescope	6
TV inferior to Kinescope	0

Kinescope superior to Local Instructor	4
Kinescope equivalent to Local Instructor	2
Kinescope inferior to Local Instructor	2

* No tests were administered.

TABLE 5

SUMMARY OF INTERPRETATIONS OF DIFFERENCES BETWEEN MEAN FINAL TEST SCORES OF SPECIFIED ENLISTED AIRMEN GROUPS, WITH ADJUSTMENTS FOR INITIAL INEQUALITIES

Title of Session	Television Compared to Local Instructor (LI)	Television Compared to Kinescope (K)	Kinescope Compared to Local Instructor
1. Theory of Flight	Equivalent	Equivalent	Equivalent
2. Line Safety	LI superior	TV superior	LI superior
3. Line Servicing	LI superior	Equivalent	LI superior
4. Ordnance and Gunnery	TV superior	Equivalent	K superior
5a Weights and Balances	Equivalent	Equivalent	Equivalent
5b Squadron Organization	——*	——*	——*
6. Survival and Safety	TV superior	Equivalent	K superior
7. Jet Engines	TV superior	TV probably superior	K superior
8. Nuclear Physics	——**	——**	——**

NUMBER OF COMPARISONS INDICATING SPECIFIED CONCLUSIONS

TV superior to Local Instructor	3
TV equivalent to Local Instructor	2
TV inferior to Local Instructor	2
TV superior to Kinescope	2
TV equivalent to Kinescope	5
TV inferior to Kinescope	0
Kinescope superior to Local Instructor	3
Kinescope equivalent to Local Instructor	2
Kinescope inferior to Local Instructor	2

* Identical with data in Table 4, since all items in pretest were repeated in final test.

** No tests administered.

superiority of one instructional procedure indicated by final test data for a given comparison was paralleled by an insignificant superiority of the same procedure according to data from pretest items repeated after instruction.

All of the comparisons between television instruction and teaching by local instructors reported in Tables 2, 3, 4, and 5 have been further consolidated for ready interpretation in Table 6, which reports the percentage of comparisons indicating that television was (a) superior to, (b) equivalent to, or (c) inferior to teaching by the local instructors. This table shows that television instruction was found to be more effective than teaching by local instructors in half of the comparisons made, and was equally effective in a substantial proportion of the comparisons.

TABLE 6

CONDENSED SUMMARY OF INTERPRETATIONS OF DIFFERENCES IN LEARNING EFFECTED BY TELEVISION AND BY LOCAL INSTRUCTORS

	Percentage of Comparisons Indicating Specified Conclusions	
	Programs for Officers	Programs for Enlisted Airmen
Television superior to Local Instructor	50	53
Television equivalent to Local Instructor	38	20
Television inferior to Local Instructor	13	27

Table 7 summarizes all the interpretations of differences in learning effected by kinescope presentation compared with teaching by local instructors which were reported in Tables 2, 3, 4, and 5. When the kinescope recordings were presented as sound movies, they were found to be more effective than teaching by local instructors for 38 per cent of the officer comparisons and for 47 per cent of the enlisted airmen comparisons. Greater learning was brought about by the local instructor in only 19 per cent of the comparisons for pilot programs and 27 per cent for the enlisted programs. Kinescope presentations were as good as or better than teaching by local instructor in three-quarters of the comparisons made.

TABLE 7

CONDENSED SUMMARY OF INTERPRETATIONS OF DIFFERENCES IN LEARNING EFFECTED BY KINESCOPE AND BY LOCAL INSTRUCTOR PRESENTATIONS

	Percentage of Comparisons Indicating Specified Conclusions	
	Programs for Officers	Programs for Enlisted Airmen
Kinescope superior to Local Instructor	38	47
Kinescope equivalent to Local Instructor	44	27
Kinescope inferior to Local Instructor	19	27

Table 8 presents a condensed summary of interpretations of comparisons between learning resulting from viewing television lessons directly with that resulting from viewing recordings of the lessons. (This table is based on material extracted from Tables 2, 3, 4, and 5.) In this table only, for the sake of simplicity, three comparisons earlier placed in the interpretative category "probably significant" because they were significant at approximately the three per cent confidence level were here merged with comparisons in the "significant" category. For officer programs, the two procedures were shown to be equally effective by 94 per cent of the comparisons made. In the case of the programs for the enlisted airmen, television and kinescope recordings were indicated to be equally effective in 73 per cent of the comparisons, and television was indicated as more effective in 27 per cent of the evaluations.

TABLE 8

CONDENSED SUMMARY OF INTERPRETATIONS OF DIFFERENCES IN LEARNING EFFECTED BY TELEVISION AND KINESCOPE PRESENTATIONS

	Percentage of Comparisons Indicating Specified Conclusions	
	Programs for Officers	Programs for Enlisted Airmen
Television superior to Kinescope	6	27
Television equivalent to Kinescope	94	73
Television inferior to Kinescope	0	0

2. ACCEPTABILITY OF TELEVISION INSTRUCTION. The comments which trainees were invited to write in the test booklets after each program indicated that television instruction was, in general, very favorably received by them. Some details of various programs were given specific criticisms, but there were only a few complaints that any lesson as a whole was poor or dull. There was considerable similarity between the comments of officers and enlisted airmen regarding the two series of television programs.

Comments of Officers

Summary of comments by officers, presented in Table 9. From 36 to 73 per cent of the officers participating in each television lesson wrote some comment in the test booklets. Remarks varied from a few lines to rather lengthy statements. When transcribed from the test booklets, the verbatim reports for the eight sessions aggregated 43 pages of single-spaced typewriting. Except for the large number of comments stating that the programs were good in general, there were more adverse comments regarding details than favorable comments. Apparently, when a feature

TABLE 9

SUMMARY OF WRITTEN COMMENTS BY OFFICERS IN THE TELEVISION CLASSES REGARDING EACH OF THE EIGHT PROGRAMS

	CIVIL AIR REGULATIONS	AEROLOGY I	AEROLOGY II	NAVIGATION REVIEW	RADIO AIDS TO NAVIGATION	ENGINEERING	HIGH ALTITUDE FLYING	CROSS COUNTRY FLIGHT
Number in Television classes –	119	93	128	113	129	66	100	108
Number of Men Writing Comments –	78	71	83	67	94	40	47	39
I. Subject Matter and Organization of Material								
A. Quantity and rate of presentation								
Presented satisfactorily	0	2	1	0	0	0	1	0
Too much material and/or too rapidly presented	17	20	15	17	40	3	3	1
Presented too slowly	0	1	2	1	0	1	0	0
B. Attitude of viewers regarding quality of program								
Program interesting and/or of value	56	34	40	26	53	12	32	25
Program good in general, but limited on one or more counts	21	8	14	18	16	8	2	0
Program poor	0	4	6	8	6	1	0	7
Classroom and/or training film as good or better than TV	0	6	6	3	3	0	1	0
C. Accuracy of material challenged by viewers								
Number challenging	2	0	1	2	1	1	0	0
D. Appropriateness of material for viewing groups								
Program appropriate	1	0	0	2	0	0	0	0
Emphasize practice rather than theory	2	10	4	3	16	8	0	0
E. Length of session								
About right	0	0	1	0	0	0	0	0
Too long	2	12	18	2	1	3	3	0

TABLE 9 (continued)

	CIVIL AIR REGULATIONS	AEROLOGY I	AEROLOGY II	NAVIGATION REVIEW	RADIO AIDS TO NAVIGATION	ENGINEERING	HIGH ALTITUDE FLYING	CROSS COUNTRY FLIGHT
Number in Television Classes –	119	93	128	113	129	66	100	108
Number of Men Writing Comments –	78	71	83	67	94	40	47	39
F. Visual Aids								
Visual aids good	9	6	0	3	1	1	2	0
Insufficient visualization	8	2	5	3	2	2	1	2
Visual aids poorly chosen and/or presented	3	8	3	2	3	1	1	0
G. Adequacy of student-instructor communication								
Question periods adequate	0	0	1	4	0	0	0	1
Insufficient opportunity to ask questions	3	14	9	0	10	3	2	3
II. Technical Aspects and Classroom Conditions								
A. Picture quality								
Good	1	4	2	0	2	0	0	0
Poor	1	0	0	0	2	3	1	1
B. Audio quality								
Good	0	3	2	0	2	0	0	0
Poor	0	2	0	0	1	0	1	1
C. Classroom conditions								
Seating arrangement good	3	2	0	0	1	1	0	1
Seating arrangement poor	1	2	2	0	2	6	1	0
Ventilation good	0	0	0	0	0	0	0	0
Ventilation poor	2	2	0	0	1	0	0	0
Classroom noise during tests annoying	0	0	0	1	0	1	0	0
Classroom lighting inadequate	0	0	3	0	0	0	0	0
III. Instructor								
Instructor good	0	6	2	2	0	0	2	0
Instructor poor	6	18	7	3	4	6	8	1
IV. Tests								
Tests satisfactory	0	0	0	0	1	0	0	1
Difficult and/or ambiguous	1	1	3	1	0	2	0	0
Material not fully covered in lecture	4	7	7	11	13	7	9	11

of the program was of acceptable quality, no comment was made by most of the viewers.

After a careful reading of the comments, tentative categories were adopted for tabulating the frequency of recurring remarks. Following several revisions of these categories, it was found possible to tabulate substantially all of the pertinent comments by use of the response categories included in Table 9.

Some individuals commented on only a single feature of a program, whereas others wrote remarks which touched upon a number of aspects of the television lesson. Consequently, in Table 9 it will be found that the sum of the frequencies of the various comments for a particular program will considerably exceed the number of individuals commenting upon that session.

Some complained that early programs were paced too fast. The first of four broad categories under which remarks were classified was "Subject Matter and Organization of Material" and sub-heading A dealt with "Quantity and Rate of Presentation." As reported in Table 9, Section I-A, from 15 to 20 of the individuals who viewed any one of the first four programs expressed the belief that too much material had been included in these programs, or that the material had been presented too rapidly. Of those who participated in the fifth television lesson, Radio Aids to Navigation, 40 complained that too much content was included, or that the pace was too fast. These 40 men represented 31 per cent of those viewing the program in formal classes, and constituted 43 per cent of those who wrote any comment on the lesson. The pace of the last three programs was apparently more acceptable, for only one to three individuals reported that too much material was included in any of these instructional sessions. Only one or two officers complained that any program was presented too slowly.

Comments on the quality of the programs were generally favorable, but the number of favorable comments varied from program to program. Section I-B of Table 9 reports frequency of comments regarding the quality of each program. There is a considerable variation from one program to another in the number who reported that "the program was interesting and/or of value," frequencies ranging from 12 to 56. There were also appreciable numbers who commented that given programs had merit or showed promise, but who cited specific shortcomings. These remarks are tabulated in Table 9, Section I-B, under the heading "Programs good in general, but limited on one or more counts." The specific limitations cited included such items as the following:

Too little student-instructor contact
Poor organization and/or choice of material
Lack of textbooks or other printed material
Type and amount of humor
Important items should be repeated

The first program in the series was the one most enthusiastically received. Ninety-nine per cent of those commenting on it said it was effective or interesting, or good in general with some stated limitations. This generally favorable reception may have resulted in part from the publicity preceding the first program and the enthusiasm expressed by the speakers who opened this session. For the remaining programs, from 50 to 74 per cent of the comments were favorable either with or without limitation. The sixth program, devoted to "Engineering," elicited the smallest per cent of favorable comments. It is possible that scheduling this session for the Labor Day weekend may have made it less acceptable to the reduced number of officers who participated in it.

Few asserted traditional classroom instruction or training films would have been preferred. The third line of Section I-B of Table 9 reports that from three to six individuals commented that traditional classroom instruction or training films would have been as good or better than the television instruction in the second, third, fourth and fifth sessions. This represented from 3 to 8 per cent of those making any comment on these programs, or from 2 to 6 per cent of those who viewed them.

Only a few officers considered any complete program unsatisfactory. There were no general adverse comments made regarding the first and seventh programs devoted respectively to Civil Air Regulations and High Altitude Flying. For the other six programs, from one to eight officers expressed the opinion that the program as a whole was poor. The Navigation Review and the Cross Country Flight programs received respectively 5.5 and 3.5 times as many favorable comments, limited or unlimited, as they did unfavorable comments. The remaining four programs which received any adverse comment as a whole were given from 9 to 20 times more favorable comments than unfavorable ones. Majority opinion is clearly favorable to the television presentations, but the ratio of favorable to unfavorable comment varies considerably from one program to another.

Only one or two officers challenged the accuracy of any material in a television session. Section I-C of Table 9 shows that one or two officers challenged the accuracy of some of the material presented in five of the eight programs. The points raised were all highly specific and related to brief sequences in the programs. In some instances, the charged "errors" represented momentary lapses on the part of the instructor and in other cases were due to failure to qualify statements sufficiently. It is interesting to note that the accuracy of the eight hours of instruction received only seven challenges from the 856 participants in the television classes.

Some programs were considered too theoretical by about one-sixth of viewing group. From one-fifth to one-seventh of those commenting on Aerology I, Radio Aids to Navigation and Engineering sessions expressed the belief that more emphasis should have been given to practical aspects of those subjects and less to theory. As shown in Section I-D of Table 9, similar remarks were made by smaller numbers of individuals regarding three additional programs.

One-hour program apparently was not considered too long in most instances, but there are exceptions. The two Aerology sessions were judged to be too long by 12 and 18, respectively, of the officers participating in these instructional sessions. These frequencies represented 17 per cent and 22 per cent of the numbers making any comment on these two programs, or roughly one out of seven of those who viewed the programs. Five of the six remaining sessions were also judged to be too long by from one to three of the participants. A television instructional session one hour in length is apparently acceptable to a great majority of those who took part in this study, but the character, pace or content of a teaching period may make it seem unreasonably long to an important minority.

Only a few officers commented on visual aids. Section I-F of Table 9 presents a tabulation of comments on the visual aids utilized in the eight programs. From two to eight of the officers making comments on the various programs considered that there was insufficient visualization or that the visual aids were poorly chosen and/or poorly presented. An equal or smaller number of participants in each program considered the visual aids to be good, the number ranging from zero to nine.

Opportunity for the student to communicate with the instructor was found inadequate by 10 per cent of the officers viewing three programs. The opportunity for student-instructor communication was judged to be inadequate by from 9 to 14 of the participants in the Aerology I, Aerology II, and Radio Aids programs. For each of five of the remaining programs, two or three individuals considered communication between student and instructor to be inadequate. Considering the eight programs as a whole, 44 participants considered there was insufficient opportunity to ask questions while only 6 considered the question periods adequate.

Very few complained about the television picture or viewing conditions. Section II of Table 9 presents tabulations of comments on Picture Quality, Audio Quality, and Classroom Conditions. The number of comments in each category for a single program seldom exceeds two, and is frequently zero. There were few complaints for any program regarding either video or audio quality. A few more officers considered the seating arrangement poor than considered it good. There were only five complaints for the eight programs about poor ventilation. Classroom noise during tests and inadequate lighting each were the object of a few complaints. From the small number of comments and the division of opinion among them, it is concluded that video quality, audio quality, and classroom conditions were acceptable to most of the participants in these programs.

Each instructor was considered inadequate in one or more respects by from one to eighteen viewers. There were four times as many adverse comments about the instructors as there were favorable comments. Some of the 53 adverse comments for the eight programs were unqualified, while others referred to specific characteristics such as delivery, voice, attitude, and apparent knowledge of subject matter. Section III of Table 9 presents the data regarding comments on instructors.

Tests claimed to include topics not treated in the television session. The fourth and last of the categories under which comments were tabulated refers to "Tests." From zero to three individuals considered the tests used for a particular program to be "difficult and/or ambiguous," but such comments averaged only one per program. There was considerably more complaint that the test items for a particular session covered some material which was not treated in the television instruction. These comments averaged between eight and nine per program. Most of these were legitimate complaints, for in each lesson plan some material was either not treated in the television session or was given only casual treatment. Since the tests were designed to cover the content indicated by the lesson plan rather than only the material treated in the television session, any appreciable departure from the lesson plan by the television instructor resulted in justifiable complaints that some test items were not touched upon in the given instructional session.

Comments of Enlisted Airmen

About half of the viewers wrote some comment regarding the television sessions. The enlisted airmen accepted the invitation to write comments, favorable or unfavorable, regarding the television programs only a little less frequently than did the officers. From 44 to 65 per cent of the participants in the television classes for enlisted airmen wrote comments upon the various programs. When transcribed from the test booklets, these comments occupied 40 pages of single-spaced typewritten material. These comments were edited and classified under headings substantially similar to those developed for classifying the comments of pilots, and Table 10 reports the frequency of each type of comment for each of the television lessons. The two parts of the fifth session dealing with "Weights and Balances" and "Squadron Organization" are here treated as a unit since there was no consistent differentiation of comments for the two topics.

Some programs were considered paced too fast by a small number of viewers. Ten participants in the Ordnance and Gunnery Session considered that too much material had been presented or that the rate of presentation was too rapid. These constituted 13 per cent of those who commented on this program or 8 per cent of those who viewed it in the formal classes. Seven viewers, or 10 per cent of those making comments, had a similar complaint regarding the Jet Engines session. For three of the remaining sessions, from one to four individuals commented that too much material had been introduced, and for two of the sessions, Line Safety and Line Servicing, no complaints about pace were recorded.

A majority of the trainees reacted favorably to each of the television sessions, but the frequency of favorable comment varied considerably from program to program. In Section I-B of Table 10 are reported the number of comments indicating that the programs were effective and/or interesting, or that they were good in general, but limited in one or more respects. From 50 to 82 of the comments on the separate sessions were favorable without qualification. If the qualified and unqualified remarks are considered together, the range of generally favorable comments for the various programs is from 57 to 93 per cent of the number of persons making any comment on the given sessions.

The Survival and Safety program received the smallest percentage of generally favorable comments, namely 57 per cent. This session was presented on the Labor Day weekend, and it is possible that the smaller number of men participating in this session were less favorably inclined toward the training situation because of the holiday. It will be recalled that the Engineering program for officers was also scheduled on the holiday weekend, and it received the smallest proportion of favorable comments of any of the officer series of programs.

Four programs elicited over 80 per cent of generally favorable comments: Line Safety (83 per cent), Line Servicing (93 per cent), Ordnance and Gunnery (84 per cent) and Jet Engines (82 per cent).

Traditional classroom procedures or training films were preferred by few, except for one program. Slightly more than ten per cent of those commenting on the "Weights and Balances" and "Squadron Organization" presentations asserted that traditional classroom treatment and/or training film would be as good or better than the television instruction. From one to three trainees made similar assertions regarding each of the three other programs.

There were only three comments on the series of seven sessions expressing the view that practice rather than theory should be emphasized (Section I-C, Table 10). There was apparently no strong feeling among the trainees that the instructional sessions were too theoretical.

One program was considered too long by seven trainees. A total of only 18 comments on the seven sessions (Section I-D) expressed the belief that the television lessons were too long, and seven of these referred to one session, namely "Weights and Balances" and "Squadron Organization."

Insufficient visualization was claimed for the first two programs. Section I-E of Table 10 reports tabulations of comments on visual aids. On the first two programs, 18 per cent and 14 per cent, respectively, of those making comments asserted that there was insufficient visualization. For the remaining programs, from one to five individuals reported an inadequate amount of visual aids, these frequencies representing from three to eight per cent of those who wrote comments on the programs concerned. Commendation of the visual aids used were given by from two to nine of the individuals commenting on five of the sessions.

TABLE 10

SUMMARY OF WRITTEN COMMENTS BY ENLISTED AIRMEN IN THE TELEVISION CLASSES REGARDING EACH OF THE SEVEN PROGRAMS

	THEORY OF FLIGHT	LINE SAFETY	LINE SERVICING	ORDNANCE & GUNNERY	WTS. & BALANCES SQUADRON ORGAN.	SURVIVAL & SAFETY	JET ENGINES
Number in Television Classes –	121	122	118	119	124	70	123
Number of Men Writing Comments –	68	64	71	77	63	31	72
I. Subject Matter and Organization of Material							
A. Quantity and rate of presentation							
Too much material and/or too rapidly presented	1	0	0	10	4	2	7
Insufficient material	0	0	0	0	1	0	0
B. Attitude of viewers regarding quality of program							
Program interesting and/or of value	34	45	58	54	36	18	53
Program good in general but limited for one or more reasons	13	8	8	11	14	7	6
Lecture dull	3	2	0	0	0	0	1
Classroom and/or training film as good or better than TV	0	0	3	3	6	0	1
C. Appropriateness of material for viewing groups							
Emphasize practice rather than theory	1	1	0	0	0	0	1
Pitched too low	1	0	0	0	0	0	0
D. Length of session							
Too long	1	1	1	3	7	1	4
E. Visual aids							
Insufficient visualization	12	9	2	4	5	1	3
Visual aids poorly chosen and/or presented	0	0	0	3	0	0	0
Visual aids good	4	0	9	2	5	0	3
F. Adequacy of student-instructor communication							
Insufficient opportunity to ask questions	6	3	2	2	6	0	3
Question period adequate	0	0	1	0	0	0	0

TABLE 10 (Cont.)

	THEORY OF FLIGHT	LINE SAFETY	LINE SERVICING	ORDNANCE & GUNNERY	WTS. & BALANCES SQUADRON ORGAN.	SURVIVAL & SAFETY	JET ENGINES
Number in Television Classes –	121	122	118	119	124	70	123
Number of Men Writing Comments –	68	64	71	77	63	31	72
II. Technical Aspects and Classroom Conditions							
A. Picture quality							
Good	0	3	1	1	0	0	2
Poor	4	4	1	0	0	3	7
B. Audio quality							
Good	0	0	0	2	0	0	1
Poor	1	2	0	0	0	0	0
C. Classroom conditions							
More adequate ventilation needed	0	0	0	1	0	2	1
III. Instructor							
Good	3	1	9	3	3	5	3
Poor	17	6	4	1	7	1	8
IV. Tests							
Difficult and/or ambiguous	1	0	3	0	0	0	0
Material not fully covered in lecture	8	5	2	3	1	6	4
Tests satisfactory	0	2	0	0	0	0	0

Some trainees complained of the lack of opportunity to ask questions. Twenty-two of the remarks for the seven programs considered together, stated that there was insufficient opportunity to ask questions. Section I-F of Table 10 shows that from two to six such comments were made for each of six programs and these low frequencies represented 3 to 10 per cent of those commenting on the particular sessions.

Viewing conditions were generally considered adequate. Section II of Table 10 shows that relatively few comments were made for any one program concerning Picture Quality, Audio Quality, or Classroom Conditions. In all, there were 19 statements that Picture Quality was poor opposed to 7 claims that it was good. Only 6 trainees commented on Audio Quality and these were evenly divided between "good" and "poor." Under Classroom Conditions, only four remarks were tallied, and these all referred to poor ventilation.

Few comments were made regarding the instructors. The number of trainees commenting on the instructor for any program was relatively small (Section III, Table 10) and there was considerable variation from program to program in the ratio of "good" to "poor" ratings. For the first two programs, there were six times as many "poor" ratings as there were "good." Instructors for the third, fourth, and sixth sessions received more favorable than unfavorable comments, but for the fifth and seventh programs, this relationship was reversed.

Some test items were claimed not to be treated in the television programs. There were only four complaints in all, stating that the tests were difficult and/or ambiguous and three of these related to the tests for a single session. A considerably greater number of complaints asserted that some items in the test were not covered in the television presentation. There were from one to eight such comments for each of the seven programs. This point was discussed in connection with the Officer programs, and it was acknowledged that the criticism is a legitimate one in most instances. As the tests were based on the lesson plans, any marked deviation from the outlined content by the television producer or instructor will result in the failure to treat (or to treat adequately) one or more topics used as the basis for items included in the test.

3. COMMENTS BY THE STAFF OF THE EVALUATION PROJECT AND BY THE NAVAL ADVISORY BOARD. The comments of staff members of the Evaluation Group who viewed the lessons in the television classrooms at the various Naval Air Training Stations indicated:

a. That on the whole, the television sessions were favorably received by the reservists and held their attention and interest.

b. That while a number of graphics and models were employed, greater and more effective use of the visual aspects of television would have increased the effectiveness of the programs as training sessions. It appears probable that the television presentation of a speaker is more interesting to most observers than the radio presentation of the speaker's voice. However, there can be little question that when an instructor is talking about an operating mechanism, it is more effective for learning to have the operating mechanism (or a model or a graphic of it) appear on the screen in place of the instructor's picture. In the absence of color television, ordinary training aids painted or printed in various colors cannot be used effectively. Sharply contrasting colors may have identical gray scale values and will be reproduced similarly on the black and white television screen. Cut-away models of weapons or engines presented serious camera and lighting problems, and in most instances, were not reproduced with a fully satisfactory degree of clarity on the screens in the television classrooms.

c. That in many instances, the television production staff apparently concentrated more on "interesting camera angles" and constantly changing screen presentations for the purpose of "relieving monotony," than they did on the conveying of meanings. As a consequence, angle shots of a blackboard or a chart frequently resulted in a distorted and difficult-to-comprehend picture. In other instances, charts or models were permitted to remain on the screen for too short a period to permit trainees to read or comprehend the meanings which were to have been conveyed. In still other instances, insufficient attention was devoted to density of ideas or to vocabulary burden. It was felt that application of appropriate psycho-educational techniques in planning and producing the instructional sessions would have resulted in more effective presentations. Effective television instruction makes demands upon the production staff which differ in some respects from the demands of commercial broadcasting.

d. That the talk-back system designed to permit trainees to ask questions of the television instructor was relatively unsatisfactory. Technical operating difficulties limited the usefulness of the system, but these could be overcome under other circumstances. The basic difficulty was that the questions asked were, for the most part, trivial and could have been answered by the officer in charge of the television classroom. Some "screening" of questions is essential if optimal use of network time is to be realized in resolving the difficulties experienced by the students in the television classrooms.

The principal recommendations of the Naval Advisory Board regarding future television training sessions were:

a. That more and better visual training aids be employed.

b. That a larger number of potential television instructors be made available to a screening board, so that the board could select for participation in the television sessions, instructors who will be free from peculiarities of speech or annoying mannerisms.

c. That one hour of instruction with little or no student participation is excessively long. It was felt that a question or discussion period near the middle of the session with a second such period near the end of the hour would be desirable.

d. That closed-circuit distribution of programs be considered. Broadcasting on channels open to the public introduced public relations problems which would be eliminated by use of closed circuits. Also, the use of public television channels appeared to place a greater strain on the instructors than if they knew their instructional performances would be viewed and heard only by reservists reached by closed circuits.

e. That a training specialist be used to serve as over-all coordinator of all phases of the training sessions. In this way, training values would not be subordinated to production procedures.

4. RELATION OF PROGRAM CONTENT TO PROGRAM EFFECTIVENESS. When the television recordings were analyzed to determine the relative amount of program time devoted to various activities, it was found necessary to recognize fifteen categories under a total of 11 headings. The terms applied to these categories and brief descriptions of the type of activity assigned to each category follow:

1. OPEN AND CLOSE:	Opening and closing music, station identification, introductory or closing film which was irrelevant to the program proper, and introductory remarks describing the nature of the program.
2. SPEECHES:	Speeches which were unrelated to the subject matter of the program.

3. ANIMATED INSTRUCTIONAL FILM WITH NARRATION ON SOUND TRACK:	Animated film having meaning by itself, or amplifying the meaning conveyed by the sound track.
4. OTHER INSTRUCTIONAL FILM WITH NARRATION ON SOUND TRACK:	All non-animated sound film conveying meaning related to instruction.
5. ANIMATED INSTRUCTIONAL FILM WITH TV STUDIO NARRATOR:	Identical with Category 3, except that narration is by instructor or narrator in the television studio.
6. OTHER INSTRUCTIONAL FILM WITH TV STUDIO NARRATOR:	Identical with Category 5, except that it includes only non-animated film.
7. INSTRUCTIONAL FILM WITHOUT NARRATION:	Silent film considered to convey meaning related to instructional aspects of program.
8. ANIMATED ATMOSPHERIC FILM WITH TV STUDIO NARRATION:	Animated film conveying meaning only incidentally related to instruction and accompanied by television studio narration.
9. OTHER ATMOSPHERIC FILM WITH TV STUDIO NARRATION:	Identical with Category 8, except it includes only non-animated film.
10. ATMOSPHERIC FILM WITHOUT NARRATION:	Film conveying meaning only incidentally related to instruction, and unaccompanied by any type of narration.
11. DIRECT NARRATION:	All sequences of instruction not dramatized or accompanied by film.

12. INSTRUCTIONAL DRAMATIZED ACTION WITH OFFSTAGE NARRATION:	Role playing accompanied by off-stage narration considered to be meaningful as instruction.
13. INSTRUCTIONAL DRAMATIZED ACTION WITH DIALOGUE:	Role playing involving two or more people, one or more with speaking parts considered to have value as instruction.
14. "FILLER" DRAMATIZED ACTION WITH DIALOGUE:	Same as Category 13, but non-instructional; apparently introduced for comic relief or change of mood.
15. QUESTION PERIOD:	Periods during which the students were given an opportunity to interrogate the instructor, or, as on one program, a period during which the instructor questioned students identified by seat number in a specified classroom.

Table 11 presents the percentage of program time devoted to each of the specified activities for each of the television lessons.

Table 12 (derived from Tables 2, 3, 4, and 5) reports the number of comparisons of test results leading to the conclusion (a) that television was more effective than teaching by the local instructor, (b) that the television instruction was equivalent in effectiveness to that by the local instructor, or, (c) that the television instruction was less effective than that given by the local instructor. Comparison of the data of these two tables permits identification of the features associated with the television sessions which were more effective than teaching by local instructors and those features associated with television sessions that were less effective than teaching by local instructors.

The amount of direct narration for those television programs unequivocally indicated as superior to classroom instruction averaged approximately one-third higher than for all other programs combined. For officer programs (3) Aerology II, (5) Radio Aids to Navigation, (7) High Altitude Flying, both test comparisons indicated the greater effectiveness of television instruction and the average amount

TABLE 11

ANALYSIS OF PROGRAM CONTENT IN TERMS OF PERCENTAGE OF PROGRAM TIME DEVOTED TO SPECIFIED ACTIVITIES

	OFFICER SERIES PROGRAM NUMBER								ENLISTED AIRMEN SERIES PROGRAM NUMBER								
	1	2	3	4	5	6	7	8	1	2	3	4	5a	5b	5t	6	7
OPEN AND CLOSE	7.6	7.2	6.5	6.7	5.0	8.5	8.6	7.6	6.3	7.1	18.5	5.1	4.4	6.1	4.8	6.2	6.0
SPEECHES	21.4							6.7	21.5								
INSTRUCTIONAL FILM WITH NARRATION ON SOUND TRACK																	
(a) Animated film	9.3				22.8		7.3	5.0			1.8	2.3					8.5
(b) Other film		5.9			8.1	38.9	6.0	16.4			11.9	1.6					1.8
INSTRUCTIONAL FILM WITH TV STUDIO NARRATOR																	
(a) Animated film	1.4	6.4															
(b) Other film	13.2															4.7	0.7
INSTRUCTIONAL FILM WITHOUT NARRATION					0.2												
ATMOSPHERIC FILM WITH TV STUDIO NARRATION																	
(a) Animated film													0.4		0.3		
(b) Other film								0.5			0.1			18.9	5.2		0.3
ATMOSPHERIC FILM WITHOUT NARRATION									3.7								
DIRECT NARRATION, WITH OR WITHOUT VISUAL AIDS	36.1	71.4	92.8	86.0	56.8	39.5	78.2	51.7	65.1	36.2	33.1	70.8	94.1	75.0	88.9	87.5	80.3
INSTRUCTIONAL DRAMATIZED ACTION WITH																	
(a) Offstage narration										42.7	20.6						
(b) Dialogue	11.0	1.0		0.8		9.3		6.2				12.8					
"FILLER" DRAMATIZED ACTION WITH DIALOGUE		3.7						1.1	0.4			7.5	1.1		0.8		
QUESTION PERIOD		4.4	0.7	6.5	7.0	3.8		4.8	2.9	14.1	14.0					1.7	2.3

TABLE 12

NUMBER OF COMPARISONS OF TEST RESULTS FOR EACH PROGRAM INDICATING SPECIFIED CONCLUSIONS REGARDING EFFECTIVENESS OF TELEVISION INSTRUCTION RELATIVE TO TEACHING BY LOCAL INSTRUCTORS

INDICATED CONCLUSION:

	OFFICER PROGRAM NUMBER							
	1	2	3	4	5	6	7	8
TV Superior to Local Instructor			2	1	2		2	1
TV Equivalent to Local Instructor	2	1		1		1		1
TV Inferior to Local Instructor		1				1		

	ENLISTED AIRMEN PROGRAM NUMBER							
	1	2	3	4	5a	5b	6	7
TV Superior to Local Instructor				2	1	1	2	2
TV Equivalent to Local Instructor	2				1			
TV Inferior to Local Instructor		2	2					

of program time devoted to direct narration was 76 per cent as shown in Table 13. The corresponding percentage for all other officer programs averaged 57 per cent. In the case of the enlisted programs, both test comparisons indicated greater effectiveness of television programs (4) Ordnance and Gunnery, (6) Survival and Safety, and (7) Jet Engines, and the sole comparison for Lesson 5b indicated the same conclusion. The average percentage of program time given to direct narration for these more effective programs was 78 per cent, contrasted to 57 per cent for all the other enlisted programs. Table 11 shows that the sixth officer program, Engineering, used an unusually large amount of non-animated instructional film with narration on the sound track (38.9 per cent of program time). Table 12 shows that the two test comparisons indicated this program to be either equivalent to the local instruction or inferior to the local instruction. In contrast, the fifth officer program, Radio Aids to Navigation, devoted 22.8 per cent of program time to animated instructional film with narration on sound track, and both test comparisons indicated that television instruction was more effective than teaching by the local instructor.

Two of the television programs for enlisted airmen, (2) Line Safety and (3) Line Servicing, were markedly less effective than local instruction. The analysis of program content showed that these two programs were the only two which used dramatized action with off-stage narration. Forty-three per cent of the Line Servicing program, and 21 per cent of the Line Safety program were devoted to this type of presentation. Table 5 also shows that the question periods for these two programs were twice as long as for any other sessions, accounting for 14 per cent of the hour for each lesson.

The noted relationships between program effectiveness and proportion of program time devoted to specified activities are suggestive rather than conclusive in character. However, they do indicate the need for planned and systematic variation in the type of treatment accorded given topics.

TABLE 13

AVERAGE PERCENTAGE OF PROGRAM TIME DEVOTED TO DIRECT NARRATION

	Officer Programs	Enlisted Programs
On television programs shown by all test evidence to be more effective than teaching by local instructor	76	78
On all other television programs	57	57

PROBLEMS IN EXPLOITING TELEVISION FOR RAPID MASS TRAINING

The principal problems which would be encountered in exploiting television instruction for rapid mass training are:

1. Procurement or training of instructors. Currently, very few instructors have had any experience in teaching before television cameras.

2. The training of personnel in special techniques to adapt production procedures to the requirements of mass training. Effective educational television sessions make demands upon production personnel which differ in important respects from the demands of commercial television entertainment sessions.

3. Procurement of personnel who know how to develop television lesson outlines or scripts in a manner which would incorporate sound educational practices.

4. Procurement of physical equipment for the studio and for television classrooms. During an emergency period, procurement of electronic equipment offers serious problems unless plans are made in advance.

5. Training or procurement of personnel to maintain equipment in proper working order. Electronic engineers and technicians require training and experience with television equipment if they are to operate effectively.

6. Accession or construction of distribution facilities. For distribution of programs to widely separated stations, use of co-axial cable circuits or microwave relay networks would be required. Less serious distribution problems would be encountered if the programs were to be distributed to groups within a single station.

SUMMARY

This study can be summarized by brief answers to the questions stated at the beginning of this report, and repeated here for convenience.

1. Q. Can television be used effectively for conveying information to widely separated groups?

A. The data of this study show that television is a feasible and effective means of conveying instruction to classes at widely separated stations.

2. Q. Do groups receiving instruction by television learn as much as groups given traditional classroom instruction?

A. For both officers and enlisted airmen, television instruction was found to be more effective than teaching by local instructors in half of the comparisons made, and it was equally effective to teaching by local instructors in an additional one-fourth of the comparisons.

3. Q. Is television instruction favorably received by reservists? Do they like it as well as their usual training sessions?

A. Comments written by trainees immediately following television sessions indicated that the television instruction was in general very favorably received. Some details of various programs were given specific criticisms, but there were only a few scattered complaints that any lesson as a whole was poor or dull. Very few of the participants in the television instruction sessions indicated that they believed either training films or ordinary classroom instruction were as good or better than television teaching.

4. Q. Are recordings of instructional telecasts effective when later projected as sound moving pictures?

A. Recordings of instructional telecasts were extremely effective when projected as sound moving pictures. For the officer programs, the kinescope recording was equivalent in effectiveness to the television session in 94 per cent of the comparisons made. In the case of the programs for the enlisted airmen, the kinescope recordings were indicated to be equivalent in effectiveness to the television sessions in 73 per cent of the comparisons made. Kinescopes were as good or better than teaching by local instructors in three-quarters of the comparisons made. Generalization of this finding should, however, be limited to recordings which retain the element of "freshness" or "timeliness." Because they were recordings of recent live programs, the kinescopes used in this study were, perhaps, given more favorable reception than might be accorded them at a much later date.

5. Q. What problems would be encountered in using television for rapid, mass training?

A. The principal problems are (a) those of procurement and training of personnel so that sound psycho-educational techniques may be utilized in planning and producing television lessons, (b) the procurement of physical equipment and the personnel to maintain it, and (c) acquisition or construction of distribution facilities.

RECOMMENDATIONS

It has been demonstrated that effective teaching can be accomplished by instructional sessions conveyed by television to widely separated groups. It is recommended that further inquiries be initiated to determine:

1. What kinds of subject matter can be best taught by television.

2. In what training programs of the Armed Forces can television be used most economically and advantageously.

3. How good instructors can be located, and how they can be developed as television instructors.

4. What production techniques will place the least burden on the television instructor.

5. What kinds of instructional treatment are best for various types of material.

6. What amount of communication between the television instructor and trainees is essential for optimal results, and what types of communication are most satisfactory and economical.

APPENDIX A

RELIABILITY COEFFICIENTS

Table 14

APPENDIX A

TABLE 14

ESTIMATED RELIABILITY COEFFICIENTS OF FINAL TESTS BASED ON SPLIT-HALF COEFFICIENTS CORRECTED BY THE SPEARMAN-BROWN FORMULA.

OFFICER SESSIONS

	No. of Items in Final Test	No. of Cases	r_{1I}
Civil Air Regulations	50	119	.51
Aerology I	60	93	.73
Aerology II	60	128	.71
Navigation Review	55	113	.79
Radio Aids to Navigation	54	129	.61
Engineering	60	66	.59
High Altitude Flying	50	100	.53
Cross Country Flight	49	108	.58

ENLISTED AIRMEN SESSIONS

	No. of Items in Final Test	No. of Cases	r_{1I}
Theory of Flight	60	121	.76
Line Safety	70	122	.77
Line Servicing	65	118	.73
Ordnance and Gunnery	60	119	.68
Weights and Balances	39	124	.78
Squadron Organization	20	123	.68
Survival and Safety	60	70	.65
Jet Engines	50	123	.82

APPENDIX B

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Tables 15 to 30

TABLE 15

CIVIL AIR REGULATIONS

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	0.1	.28	0.4	Not Significant
TV - Kine	0.1	.27	0.4	Not Significant
Kine - Local Instr.	0.0	.28	0.0	Not Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	0.8	.49	1.6	Not Significant
TV - Kine	1.0	.48	2.1	Probably Significant
Kine - Local Instr.	-0.2	.49	0.4	Not Significant

TABLE 16

AEROLOGY I

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	-0.9	.35	2.6	Significant
TV - Kine	0.2	.33	0.6	Not Significant
Kine - Local Instr.	-1.1	.33	3.3	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	0.7	.65	1.1	Not Significant
TV - Kine	0.4	.65	0.6	Not Significant
Kine - Local Instr.	0.3	.61	0.5	Not Significant

TABLE 17

AEROLOGY II

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**$S.E._{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	1.0	.36	2.8	Significant
TV - Kine	-0.1	.35	0.3	Not Significant
Kine - Local Instr.	1.1	.36	3.1	Significant

Differences between Adjusted Final Test Mean Scores				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**$S.E._{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	1.7	.66	2.6	Significant
TV - Kine	0.0	.65	0.0	Not Significant
Kine - Local Instr.	1.7	.67	2.5	Significant

TABLE 18

NAVIGATION REVIEW

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**$S.E._{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	0.9	.37	2.4	Significant
TV - Kine	0.6	.37	1.6	Not Significant
Kine - Local Instr.	0.3	.37	0.8	Not Significant

Differences between Adjusted Final Test Mean Scores				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**$S.E._{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	0.6	.58	1.0	Not Significant
TV - Kine	1.1	.58	1.9	Not Significant
Kine - Local Instr.	-0.5	.58	0.9	Not Significant

TABLE 19

RADIO AIDS TO NAVIGATION

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	1.5	.33	4.5	Significant
TV - Kine	0.1	.33	0.3	Not Significant
Kine - Local Instr.	1.4	.33	4.2	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	2.4	.52	4.6	Significant
TV - Kine	0.3	.52	0.6	Not Significant
Kine - Local Instr.	2.1	.54	3.9	Significant

TABLE 20

ENGINEERING

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	-0.6	.39	1.5	Not Significant
TV - Kine	0.2	.40	0.5	Not Significant
Kine - Local Instr.	-0.8	.34	2.4	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	-1.9	.69	2.8	Significant
TV - Kine	0.9	.71	1.3	Not Significant
Kine - Local Instr.	-2.8	.61	4.6	Significant

TABLE 21

HIGH ALTITUDE FLYING

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction				
Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	1.2	.38	3.2	Significant
TV - Kine	0.2	.40	0.5	Not Significant
Kine - Local Instr.	1.0	.38	2.6	Significant

Differences between Adjusted Final Test Mean Scores				
Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	2.3	.54	4.3	Significant
TV - Kine	0.5	.57	0.9	Not Significant
Kine - Local Instr.	1.8	.54	3.3	Significant

TABLE 22

CROSS COUNTRY FLIGHT

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction				
Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	0.6	.45	1.3	Not Significant
TV - Kine	0.2	.45	0.4	Not Significant
Kine - Local Instr.	0.4	.44	0.9	Not Significant

Differences between Adjusted Final Test Mean Scores				
Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	1.3	.45	2.9	Significant
TV - Kine	0.8	.45	1.8	Not Significant
Kine - Local Instr.	0.5	.44	1.1	Not Significant

TABLE 23

THEORY OF FLIGHT

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**S.E.$_{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	0.3	.37	0.8	**Not Significant**
TV - Kine	-0.3	.37	0.8	**Not Significant**
Kine - Local Instr.	0.6	.37	1.6	**Not Significant**

Differences between Adjusted Final Test Mean Scores				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**S.E.$_{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	0.6	.62	1.0	**Not Significant**
TV - Kine	-0.2	.62	0.3	**Not Significant**
Kine - Local Instr.	0.8	.63	1.3	**Not Significant**

TABLE 24

LINE SAFETY

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**S.E.$_{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	-3.1	.39	7.9	**Significant**
TV - Kine	0.8	.38	2.1	**Probably Significant**
Kine - Local Instr.	-3.7	.39	9.5	**Significant**

Differences between Adjusted Final Test Mean Scores				
Groups Compared 1st minus 2nd	**Differences in Adjusted Means**	**S.E.$_{Diff}$**	**t**	**Interpretation**
TV - Local Instr.	-2.9	.69	4.2	**Significant**
TV - Kine	2.3	.69	3.3	**Significant**
Kine - Local Instr.	-5.2	.69	7.5	**Significant**

TABLE 25

LINE SERVICING

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	-3.5	.35	10.0	Significant
TV - Kine	-0.5	.35	1.4	Not Significant
Kine - Local Instr.	-3.0	.35	8.6	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	-4.6	.58	7.9	Significant
TV - Kine	-0.1	.58	0.2	Not Significant
Kine - Local Instr.	-4.5	.58	7.8	Significant

TABLE 26

ORDNANCE AND GUNNERY

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	1.0	.38	2.6	Significant
TV - Kine	-0.3	.38	0.8	Not Significant
Kine - Local Instr.	1.3	.38	3.4	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	6.1	.66	9.2	Significant
TV - Kine	0.1	.67	0.1	Not Significant
Kine - Local Instr.	6.0	.67	9.0	Significant

TABLE 27

WEIGHTS AND BALANCES

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	1.2	.34	3.5	Significant
TV - Kine	0.2	.34	0.6	Not Significant
Kine - Local Instr.	1.0	.34	2.9	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	0.8	.58	1.4	Not Significant
TV - Kine	1.0	.58	1.7	Not Significant
Kine - Local Instr.	-0.2	.58	0.3	Not Significant

TABLE 28

SQUADRON ORGANIZATION

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	0.9	.35	2.6	Significant
TV - Kine	1.6	.35	4.6	Significant
Kine - Local Instr.	-0.7	.36	1.9	Not Significant

TABLE 29

SURVIVAL AND SAFETY

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	2.8	.43	6.5	Significant
TV - Kine	0.3	.43	0.7	Not Significant
Kine - Local Instr.	2.5	.37	6.8	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	6.5	.76	8.6	Significant
TV - Kine	1.0	.76	1.3	Not Significant
Kine - Local Instr.	5.5	.65	8.5	Significant

TABLE 30

JET ENGINES

COMPARISON OF LEARNING BY GROUPS RECEIVING EACH TYPE OF INSTRUCTION

Differences between Adjusted Mean Scores on Pretests Repeated after Instruction

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	5.7	.51	11.2	Significant
TV - Kine	1.0	.52	1.9	Not Significant
Kine - Local Instr.	4.7	.53	8.9	Significant

Differences between Adjusted Final Test Mean Scores

Groups Compared 1st minus 2nd	Differences in Adjusted Means	$S.E._{Diff}$	t	Interpretation
TV - Local Instr.	9.3	.80	11.6	Significant
TV - Kine	1.7	.82	2.1	Probably Significant
Kine - Local Instr.	7.6	.83	9.2	Significant

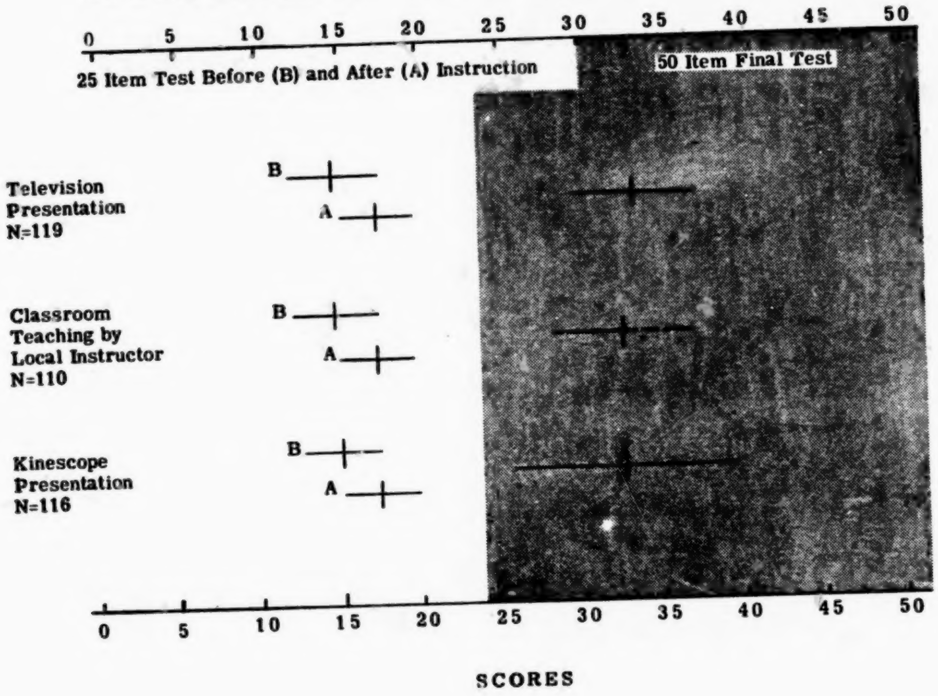
APPENDIX C

MEAN OBTAINED SCORES OF THREE GROUPS ON TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTIONS

Figures 4 to 19

FIGURE 4

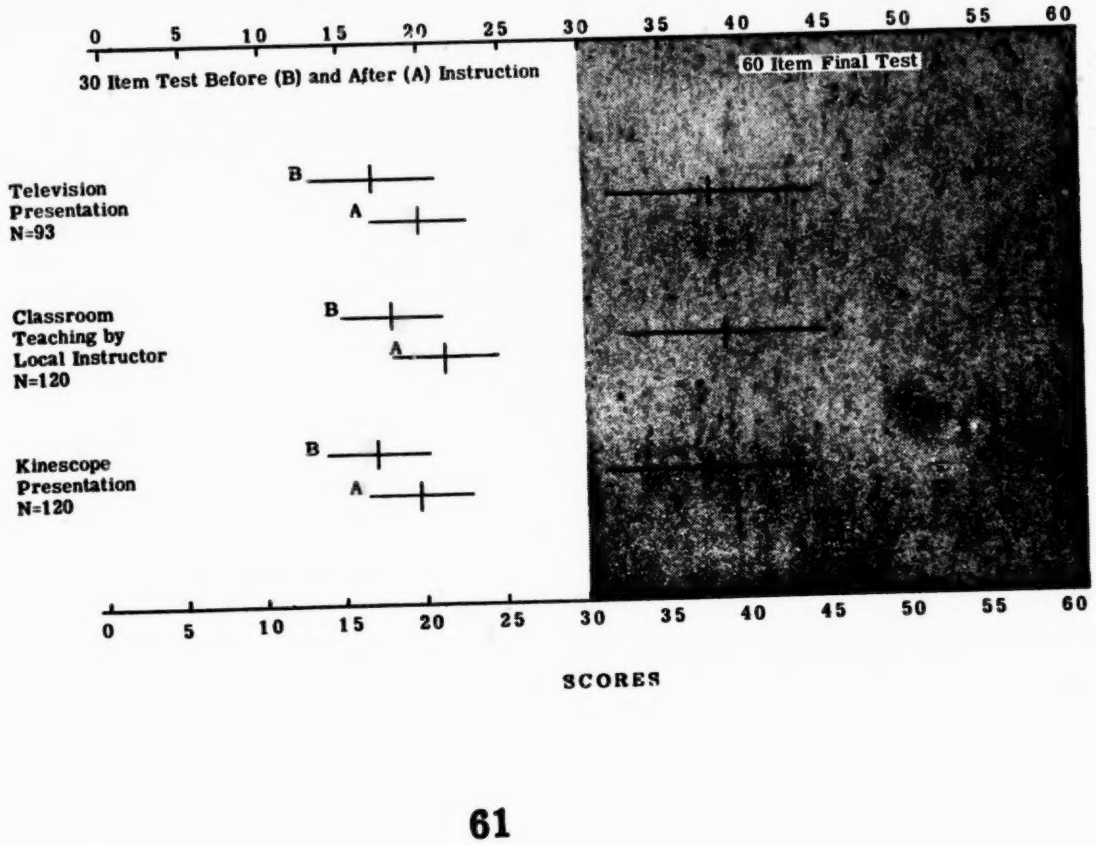
MEAN OBTAINED SCORES OF THREE GROUPS ON "CIVIL AIR REGULATIONS" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION



Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S. D. of distribution of scores.

FIGURE 5

MEAN OBTAINED SCORES OF THREE GROUPS ON "AEROLOGY I" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION



Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

FIGURE 6

MEAN OBTAINED SCORES OF THREE GROUPS ON "AEROLOGY II" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

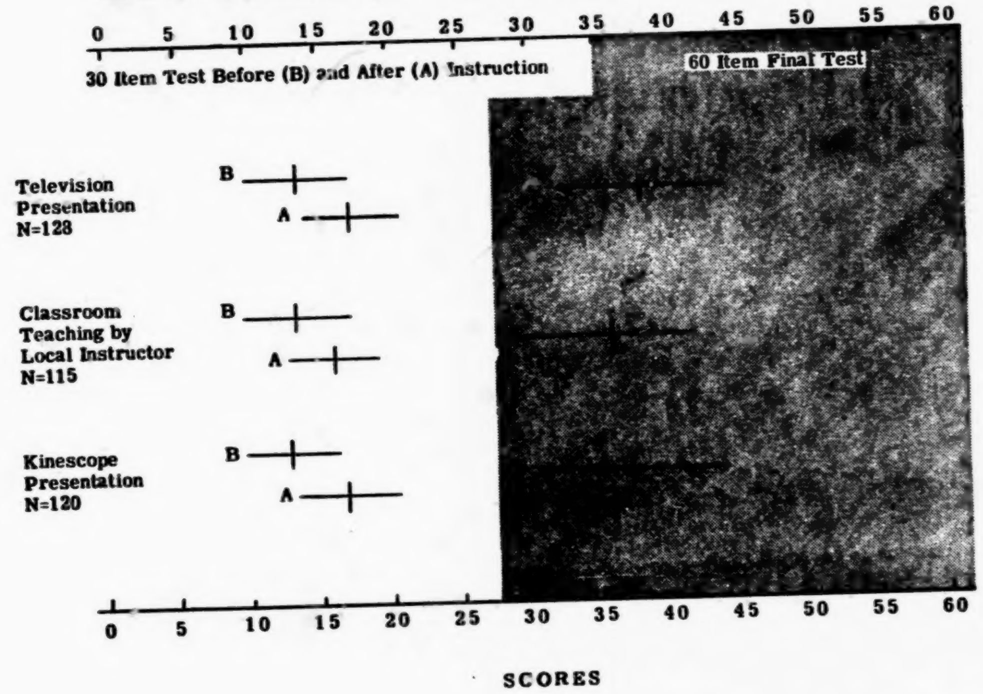


FIGURE 7

MEAN OBTAINED SCORES OF THREE GROUPS ON "NAVIGATION REVIEW" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

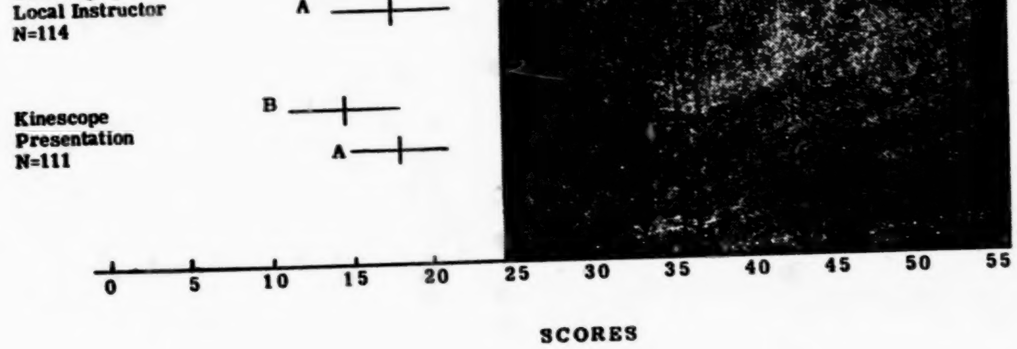


FIGURE 8

MEAN OBTAINED SCORES OF THREE GROUPS ON "RADIO AIDS TO NAVIGATION" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

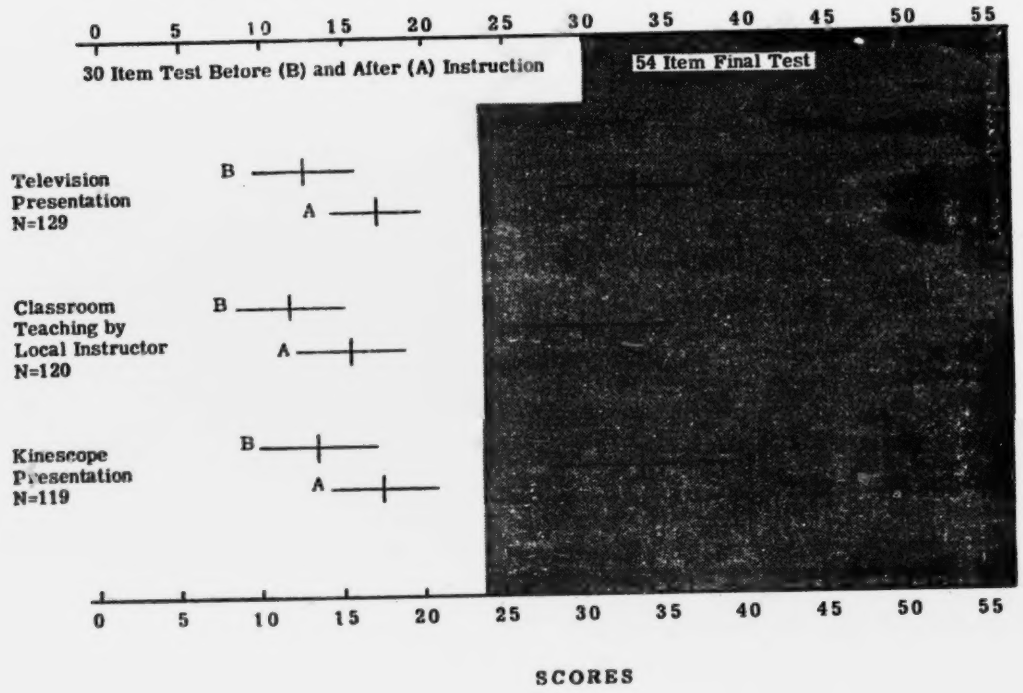


FIGURE 9

MEAN OBTAINED SCORES OF THREE GROUPS ON "ENGINEERING" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

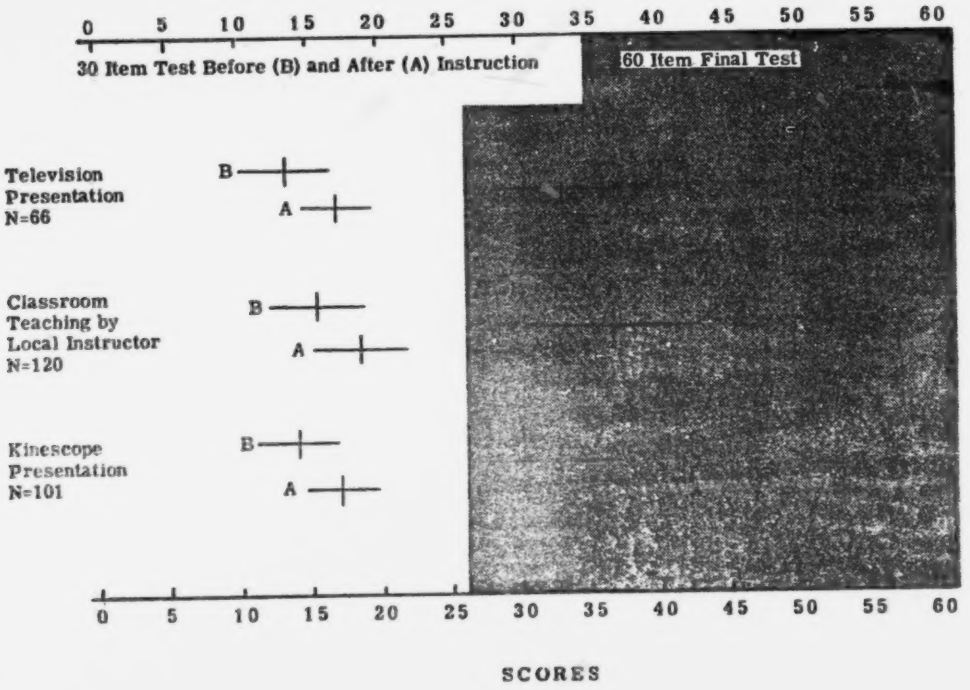


FIGURE 10

MEAN OBTAINED SCORES OF THREE GROUPS ON "HIGH ALTITUDE FLYING" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

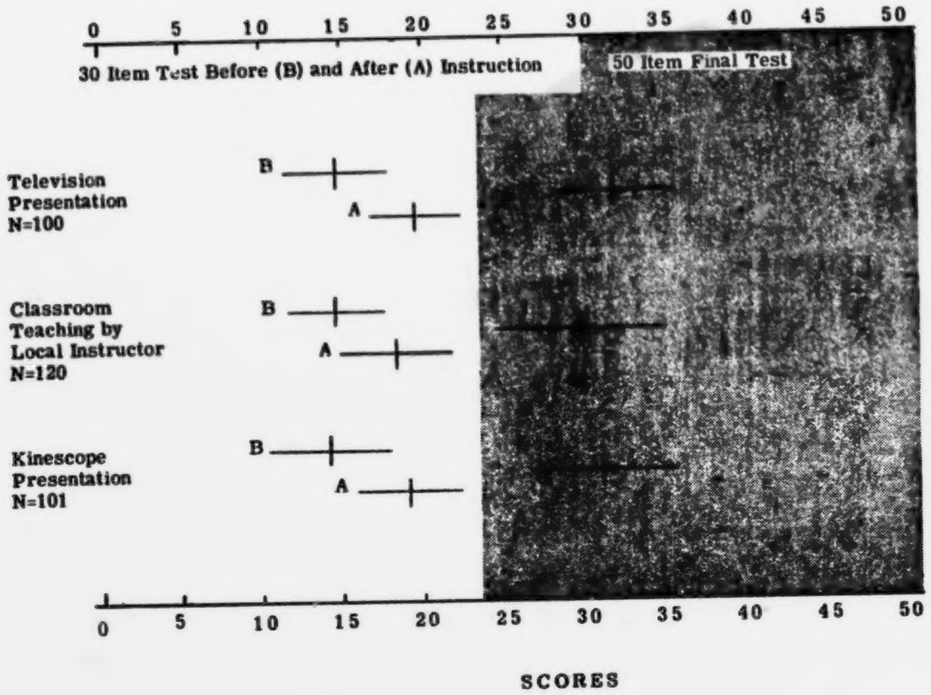


FIGURE 11

MEAN OBTAINED SCORES OF THREE GROUPS ON "CROSS COUNTRY FLIGHT" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

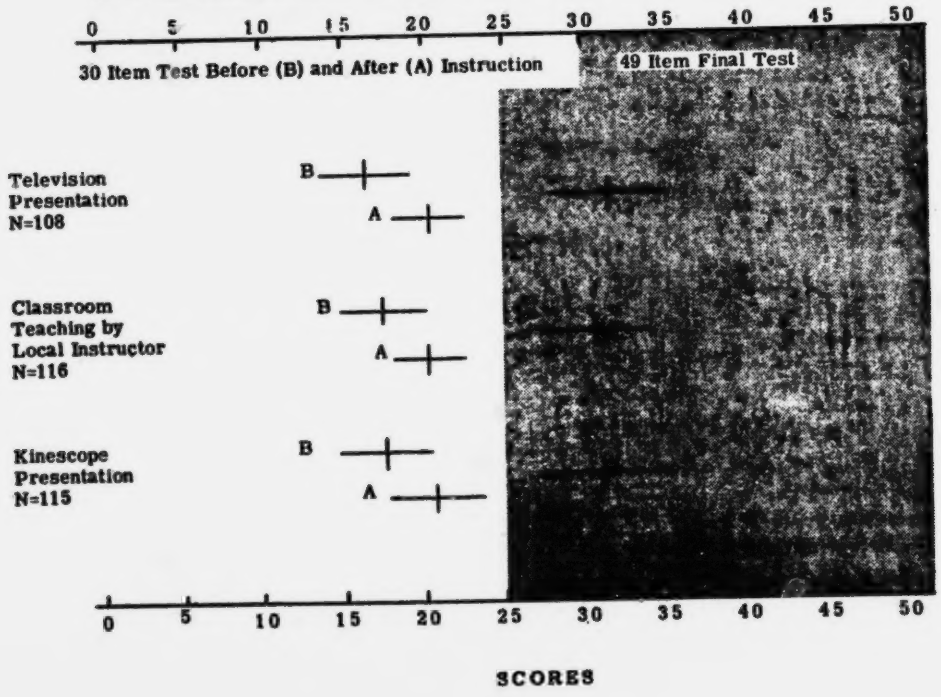


FIGURE 12

MEAN OBTAINED SCORES OF THREE GROUPS ON "THEORY OF FLIGHT" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

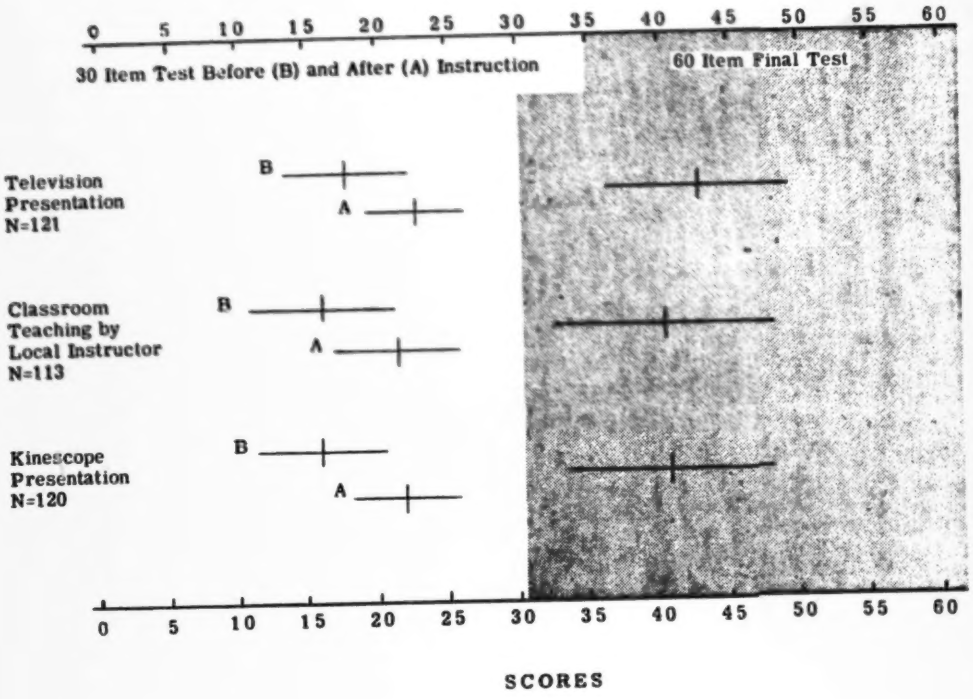


FIGURE 13

MEAN OBTAINED SCORES OF THREE GROUPS ON "LINE SAFETY" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

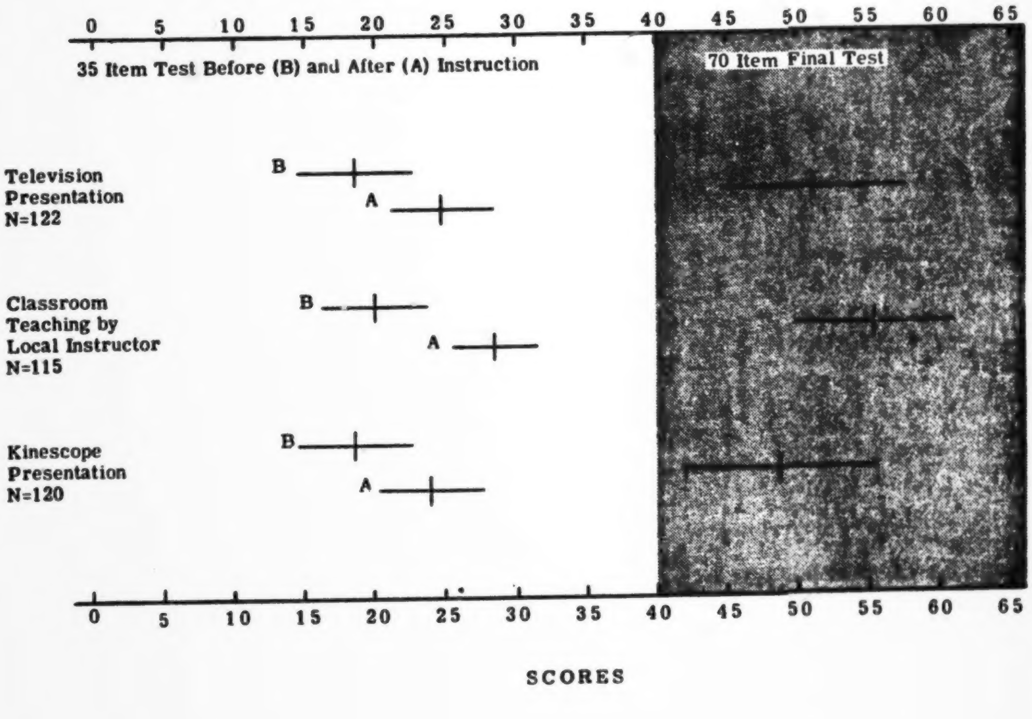


FIGURE 14

MEAN OBTAINED SCORES OF THREE GROUPS ON "LINE SERVICING" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

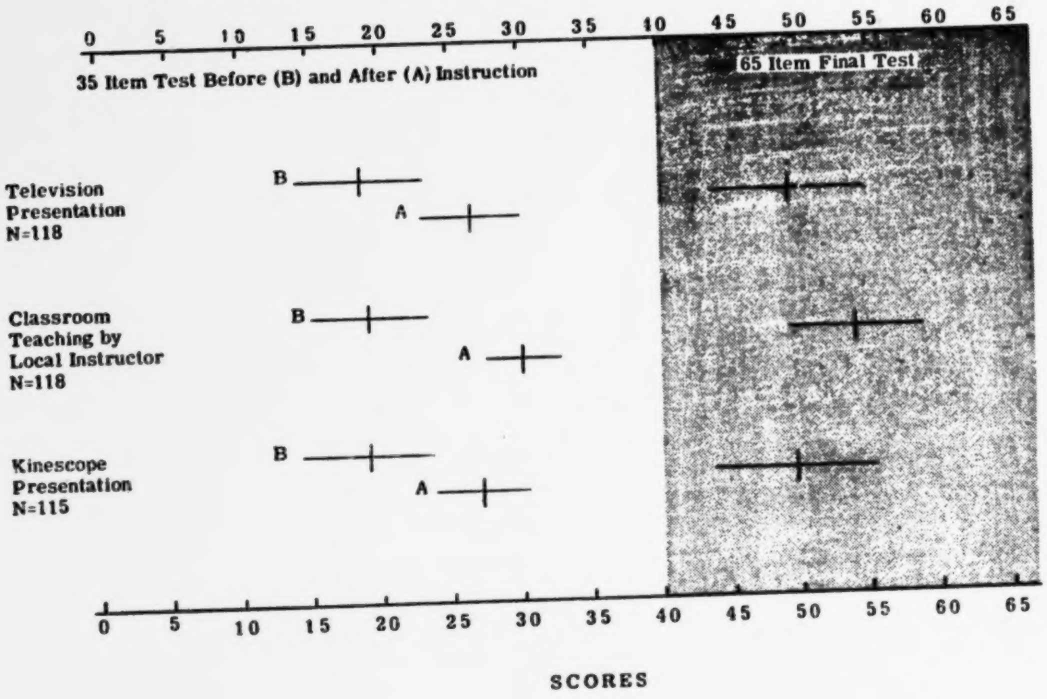
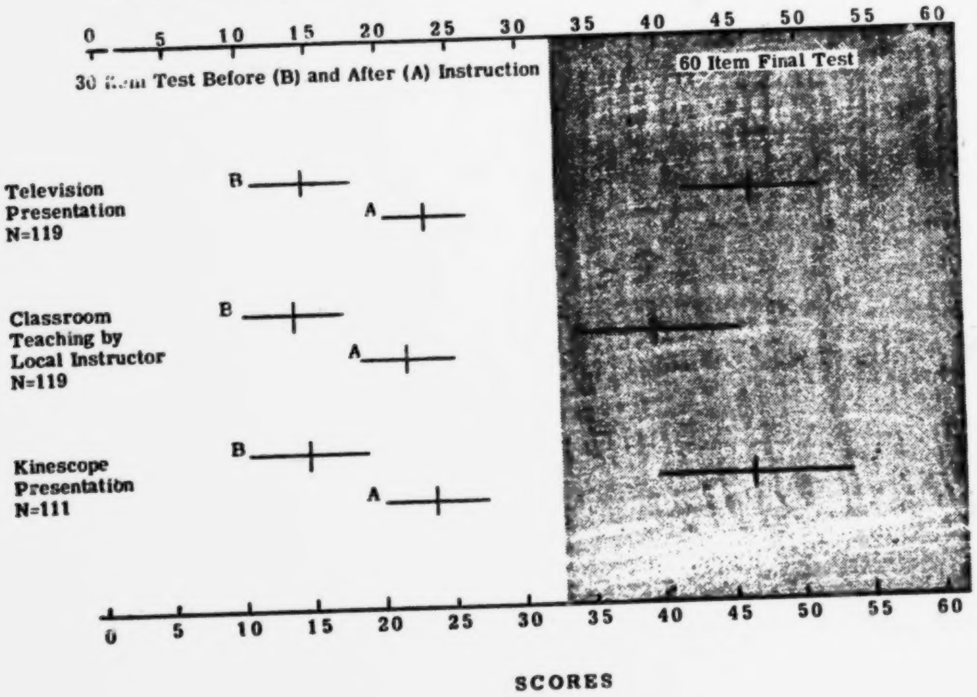


FIGURE 15

MEAN OBTAINED SCORES OF THREE GROUPS ON "ORDNANCE AND GUNNERY" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.



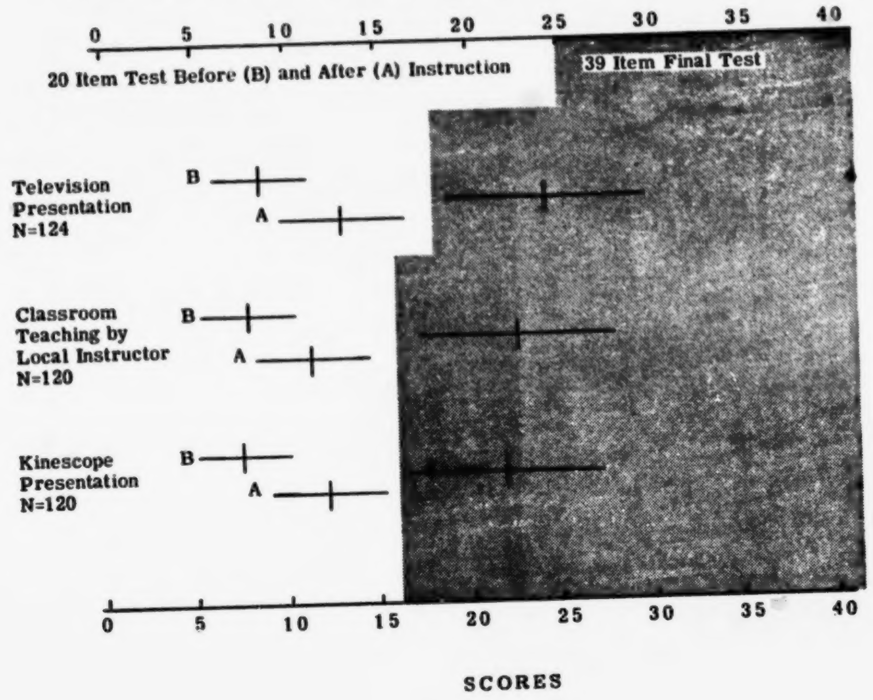


FIGURE 16
MEAN OBTAINED SCORES OF THREE GROUPS ON "WEIGHTS AND BALANCES" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

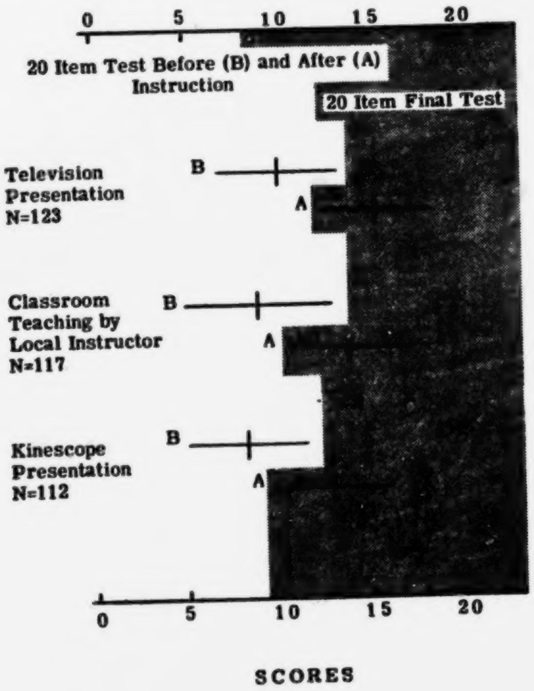


FIGURE 17
MEAN OBTAINED SCORES OF THREE GROUPS ON "SQUADRON ORGANIZATION" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

FIGURE 18

MEAN OBTAINED SCORES OF THREE GROUPS ON "SURVIVAL AND SAFETY" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.

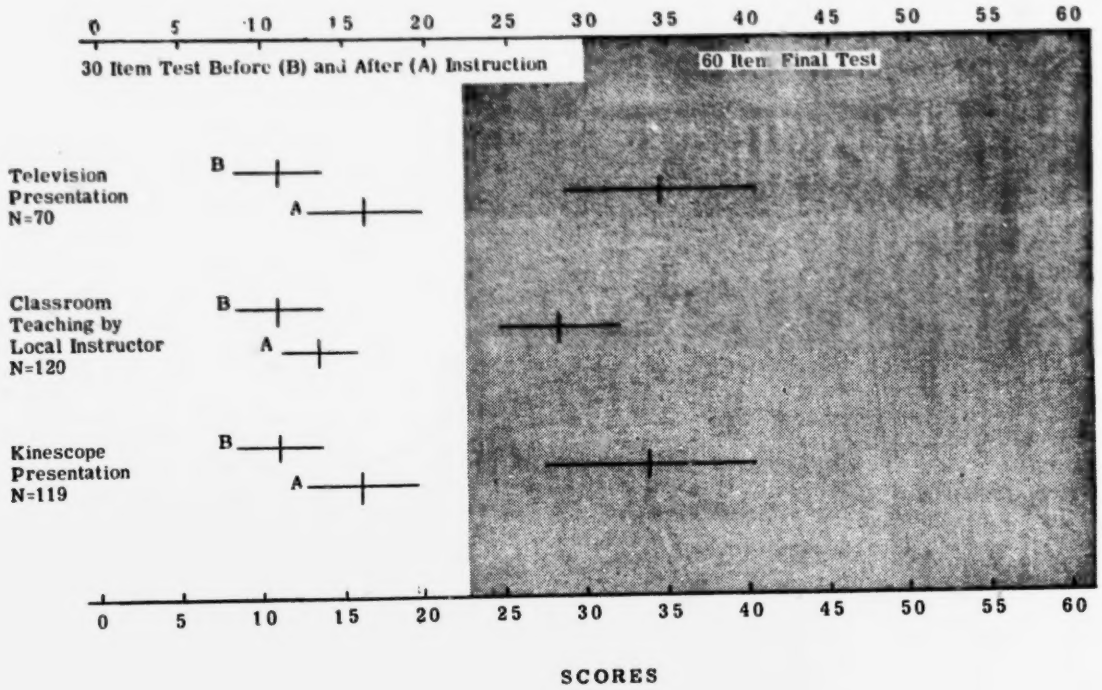
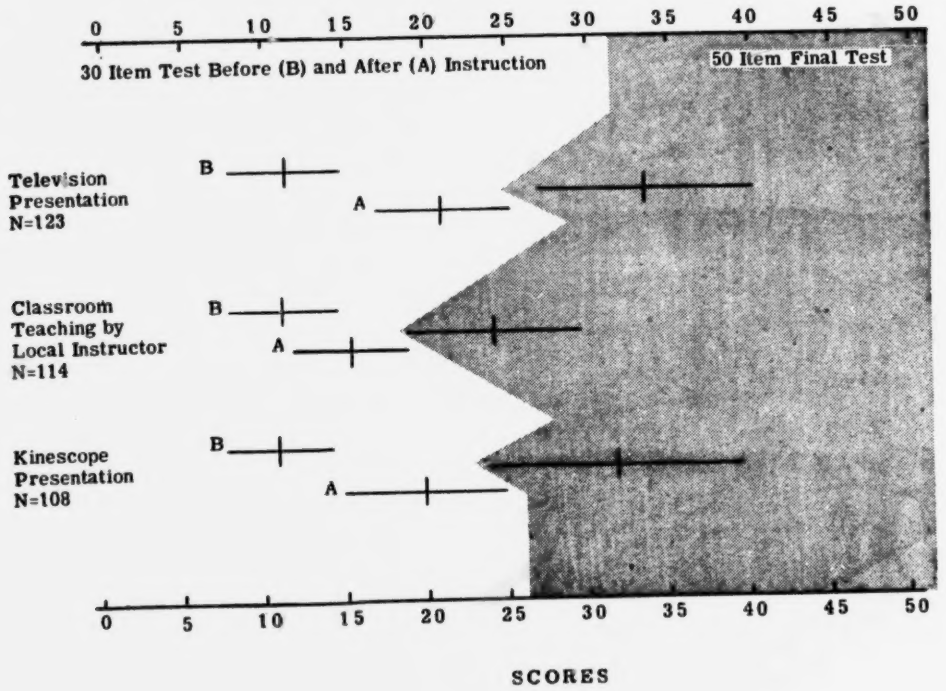


FIGURE 19

MEAN OBTAINED SCORES OF THREE GROUPS ON "JET ENGINES" TESTS ADMINISTERED BEFORE AND AFTER INSTRUCTION

Each vertical line indicates location of a mean on scale of scores. Horizontal line in each case extends from -1 S.D. to +1 S.D. of distribution of scores.



TECHNICAL REPORT SDC-476-02-S3

A STUDY OF LEARNING AND RETENTION FROM TELEVISION INSTRUCTION TRANSMITTED TO ARMY FIELD FORCE RESERVISTS

Fordham University
Television Evaluation Project
May 1951

Project Designation NR 781-007
Contract N7onr-47602
SDC Human Engineering Project 20-E-5a

FINAL PROJECT REPORT

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INTRODUCTION

This report is one of a series concerned with the evaluation of television as a medium for accomplishing rapid mass training. It is a technical supplement to the non-technical report on the same material, NAVEXOS P850-3 (SDC Report 476-02-2) "Training By Television: A Study In Learning And Retention." Both the non-technical report and the present technical supplement deal with a study of learning and retention by Army Field Force Reservists to whom a series of eight one-hour instructional sessions was conveyed by television. The instructional telecasts were transmitted over a network of ten commercial broadcasting stations, and they reached approximately 3000 reservists in 160 viewing groups. The work herein reported was conducted by the Television Evaluation Project, Department of Psychology, Fordham University, under Special Devices Center Contract No. N7onr-47602.

ACKNOWLEDGEMENTS

Gratitude is expressed to the Columbia Broadcasting System, and to a group of its affiliated stations enumerated in the text, whose generous cooperation made it possible to transmit on a network basis the instructional programs which originated in the television studio of the Special Devices Center. It is also desired to express appreciation to the following for continuing cooperation: Col. B. V. Bryant, General Staff, U. S. Army, Lt. Col. D. E. Downard and Lt. Col. Robert McDaniel of the Office of the Chief of Army Field Forces, Col. C. S. Stodter, Office of the Chief Signal Officer, Lt. Col. J. B. Buchanan of the Signal Corps Photographic Center, and Lt. Col. W. R. Kintner, Command and General Staff College.

PURPOSE

The purposes of this study were:

1. To seek additional evidence regarding the feasibility of conducting reserve training by television and to determine the effectiveness of such training.
2. To determine the extent to which material learned through television instruction is retained.
3. To determine the acceptability of television instruction to enlisted and officer personnel.
4. To study the influence of the type of instructional treatment upon the amount of learning effected.

PROCEDURE

A. DESIGN OF THE EXPERIMENT

Eight one-hour lessons each concerned with the operation of an Army Division in a combat situation were telecast at weekly intervals to more than 3000 Army Field Force Reservists. These programs originated at the U. S. Navy Special Devices Center Television Studio, and were microwaved to CBS-TV, New York, and then telecast over ten stations in the eastern and north central portions of the United States as shown in Figure 1. Reservists assembled in 160 groups to view the programs, and took tests immediately before and immediately after each instructional session.

Faculty members of the Army Command and General Staff College at Fort Leavenworth prepared the basic plans for the lessons and cooperated with technical

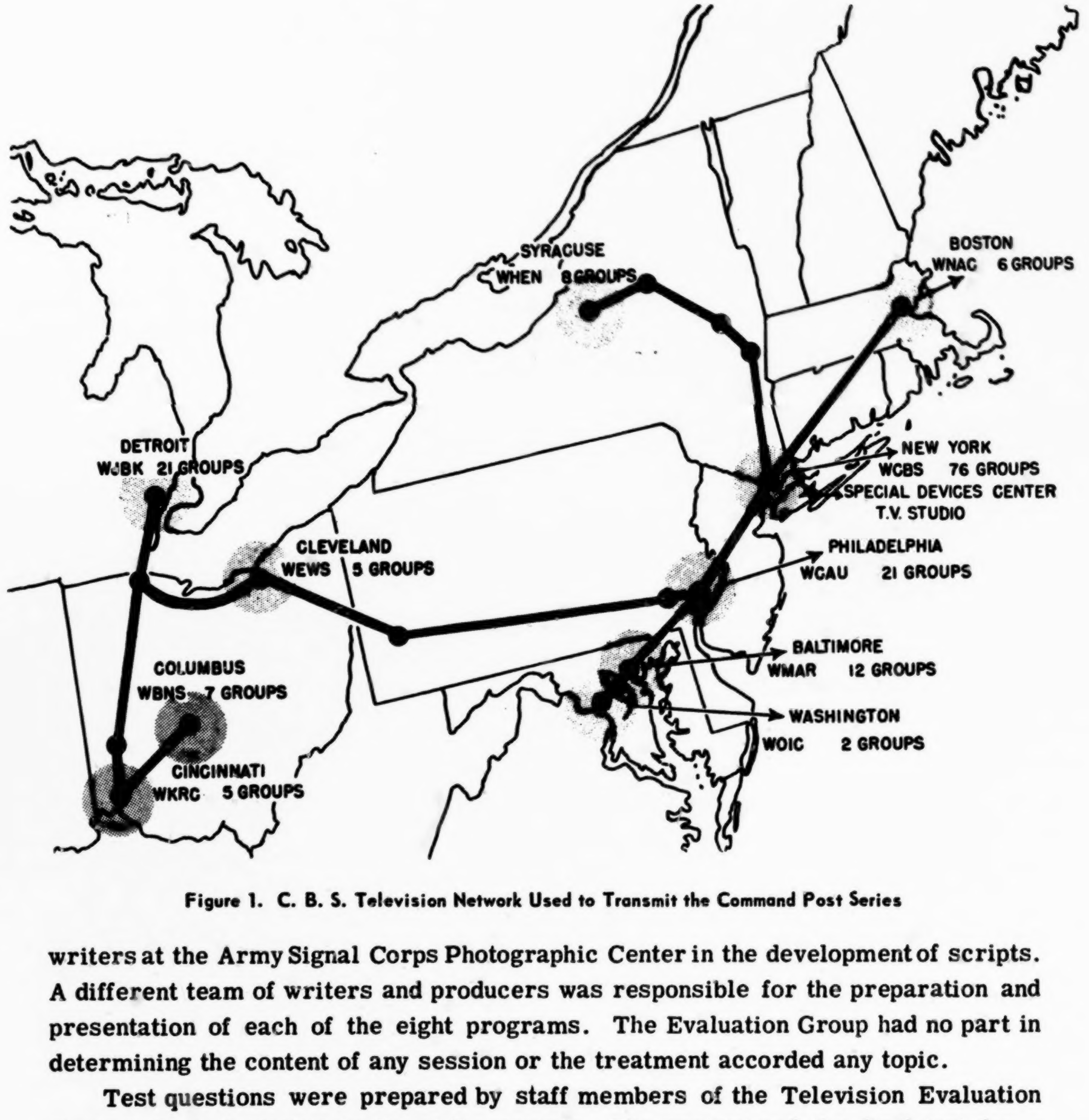
SYRACUSE
WHEN 8 GROUPS
BOSTON
WNAC 6 GROUPS
DETROIT
WJBK 21 GROUPS
NEW YORK
WCBS 76 GROUPS
SPECIAL DEVICES CENTER
T.V. STUDIO
CLEVELAND
WEWS 5 GROUPS
PHILADELPHIA
WCAU 21 GROUPS
BALTIMORE
WMAR 12 GROUPS
COLUMBUS
WBNS 7 GROUPS
WASHINGTON
WOIC 2 GROUPS
CINCINNATI
WKRC 5 GROUPS

Figure 1. C. B. S. Television Network Used to Transmit the Command Post Series

writers at the Army Signal Corps Photographic Center in the development of scripts. A different team of writers and producers was responsible for the preparation and presentation of each of the eight programs. The Evaluation Group had no part in determining the content of any session or the treatment accorded any topic.

Test questions were prepared by staff members of the Television Evaluation Project from tentative drafts of the scripts. The pretest and the final test for a given program included a group of identical questions, and learning resulting from that instructional session was measured by (a) increase in number of items correctly answered by each individual and also (b) by the increase in percentage of correct responses to single items. In the pretest booklets for Programs 3 to 8, some questions were included which had been presented before and after earlier programs. Success in responding to these repeated items was compared to success in responding to them immediately after the program in which treatment of the item had been included. In this way, measures of retention over periods of one to six weeks were secured.

Kinescope recordings of the programs were carefully analyzed to determine (a) the explicitness of treatment of topics around which items had been written, and (b) the type or types of instructional treatment accorded each of the topics covered by a test item. The relationship between the explicitness of treatment of topics and gain in percentage of correct responses to test items related to those topics was studied. The influence of the type of instructional treatment given a topic upon the amount of learning was also investigated.

Questionnaires were administered to trainees after the first and last programs to determine how acceptable they found television instruction. Experts in military and civilian training viewed each of the programs and wrote comments on prepared forms.

B. THE PROGRAMS

The series of eight one-hour television instructional sessions titled Command Post dealt with the problems encountered, and the activities engaged in, by a Division Commander, his staff, and his troops in repelling an invasion by an "aggressor" nation. The programs combined narration with numerous dramatic sequences exemplifying the activities of the Division Commander and his staff. Troop movements, convoys, armored vehicles, aircraft attacks, etc., were pictured at appropriate points in the programs by the use of motion picture film. The topics treated in the eight programs may be summarized briefly as follows:

PROGRAM 1: ESTIMATE OF THE SITUATION

A portrayal of the development of a coordinated estimate of the significance of aggressor activity by the Division Commander and members of his staff.

PROGRAM 2: ADVANCE TO CONTACT

An account of the activities involved when the Division makes its first contact with the enemy, including aircraft support, maintenance of security, protection against aggressor air force, etc.

PROGRAM 3: THE DIVISION COMMANDER'S DECISION

Presentation of the factors that determine the decision of the Division Commander about place, type, and time of attack.

PROGRAM 4: PLANNING THE ATTACK

An account of the planning of maneuvers in the attack. This includes the location of the reserve, and the direction of the attack, while the Division is maintaining contact with the enemy forces.

PROGRAM 5: THE LOGISTICAL PLAN

A treatment of the supply and service activities that must be carried on to keep combat troops in the field.

PROGRAM 6: THE HUMAN SIDE OF BATTLE

A presentation of the functions of the special staff officers concerned with the personnel aspects of combat operations, including treatment of prisoners of war and enemy civilians, as well as own troops.

PROGRAM 7: THE CONDUCT OF THE ATTACK

An exemplification of the principles of war as applied to the battle in progress. A description of the procedures for meeting emergencies and for modifying the original plan of attack in adjusting to unexpected enemy movements.

PROGRAM 8: TEAMWORK IN THE ATTACK

A review of all factors which must be taken into consideration in winning a battle; summaries of the high points of all the preceding instructional sessions with special emphasis on influence of leadership and necessity for teamwork.

C. SCRIPT WRITING, DIRECTION, AND PRODUCTION OF PROGRAMS

The basic plans for the programs were prepared by members of the faculty of the Army Command and General Staff College at Fort Leavenworth. These lessons conformed, in many respects, to demonstration lessons involving map problems which had been presented to students at the Command and General Staff College. At the Army Signal Corps Photographic Center a team of two writers, a producer, and a director was assigned to each of the eight programs. These teams worked in close cooperation with a group of officers from the Command and General Staff College or from the various Arms and Services whose activities were represented in the programs. The full facilities of the Army Signal Corps Photographic Center were utilized in preparing and producing the lessons. Crews of artists prepared the maps and other graphics, special film sequences were photographed, and stock footage was located for other scenes. Large numbers of scene painters, stage carpenters, and electricians were also used in the productions. In elaborateness of production detail, these programs were comparable to major network television shows.

The staff of the Television Evaluation Project had no opportunity to influence the content of any program or the treatment accorded any topic. Because of a close time schedule, it was necessary for the Evaluation Group to work with preliminary versions of the scripts in preparing test questions. Later changes in the scripts resulted in the deletion of some program content about which test items had been prepared.

In early discussions regarding the programs, the Evaluation Group had requested that specific objectives be stated for each section of each program in order that attainment of these specific objectives might be tested. Despite repeated requests for these specific objectives, no explicit statement of them was obtained for any program. Hence it was necessary for the Television Evaluation Project staff to deduce from the scripts what the implicit objectives of each program were conceived to be by the team of script writers.

Professional actors presented the narrative sequences and played the roles of the Division Commander and his staff. The only military personnel appearing on the programs were high-ranking officers who presented speeches either at the beginning or the close of the session. These speeches had a public relations objective and were not closely related to the instructional content of the program.

D. TESTS

Test items were developed by the Evaluation Group from the scripts as they were being prepared. Final scripts could not be used for the preparation of questions, as script revisions were practically continuous up until the hour of the program, whereas test questions had to be prepared more than three weeks in advance of the program to permit printing test booklets and distributing them to the widely scattered viewing groups.

Multiple choice test items providing four alternative responses were used. Samples of these items are shown below. The test questions were reviewed by faculty members of the Army Command and General Staff College, and correct answers agreed upon for the construction of scoring keys. There was no opportunity to try out items before they were printed in the test booklets, and the appropriateness of the difficulty level of the questions was dependent on the expert judgment of Project consultants. The test given before a training session typically consisted of two groups of items, as illustrated in Figure 2. The first group related to topics that, according to the latest available script, were to be treated in that training session. It measured knowledge of the topics prior to the television session. The second group of items tested knowledge of content of previous programs which had been tested from one to six weeks earlier. These items were included so that measures of retention could be obtained.

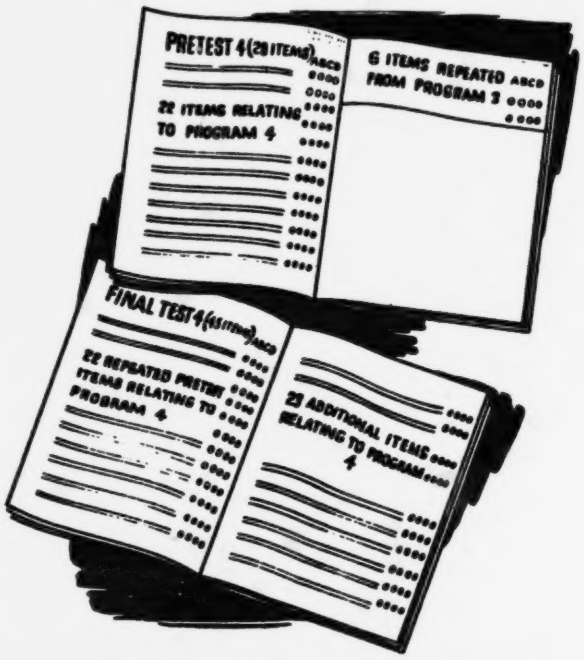
PRETEST 4 (28 ITEMS)
ABCD
22 ITEMS RELATING TO PROGRAM 4
6 ITEMS REPEATED FROM PROGRAM 3
ABCD
FINAL TEST 4 (45 ITEMS)
ABCD
22 REPEATED PRETEST ITEMS RELATING TO PROGRAM 4
23 ADDITIONAL ITEMS RELATING TO PROGRAM 4

Figure 2. A Typical Program Exercise

The final test for a given program consisted of a repetition of those items from the pretest booklet which related to the instructional content of that program, supplemented by at least an equal number of items also relating to the same program but which had not appeared earlier in any test booklet. These additional questions were included in each final test so that, as the series of programs progressed, trainees would not tend to concentrate solely on those portions of the lessons which would provide correct answers to the questions asked in the pretests.

Samples of Test Items*

PROGRAM 2: ADVANCE TO CONTACT

In this situation, ground reconnaissance and security are provided the 20th Infantry Division by

(A) the 201st Armored Cavalry, (B) the 201st Armored Cavalry and the 205th Reconnaissance Company, (C) the regimental combat teams, (D) the 20th Tank Battalion.

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* Correct answers are underlined on these samples only.

PROGRAM 2: ADVANCE TO CONTACT

Use of regimental combat teams permits the Division Commander to

(A) decentralize control to subordinate commanders, (B) spread out his forces over the entire area, (C) meet all aggressor threats, (D) pass responsibility for accomplishment of the mission to the combat team commanders.

PROGRAM 3: THE DIVISION COMMANDER'S DECISION

In average terrain and against normal resistance, the most frequent formation of an Infantry Regiment in attack is

(A) one Battalion in assault and two Battalions in reserve, (B) two Battalions in assault and one Battalion in reserve, (C) two Battalions plus in assault and one Battalion minus in reserve, (D) three Battalions in assault.

PROGRAM 4: PLANNING THE ATTACK

Blind spots in the anti-aircraft artillery radar screen are covered by

(A) warnings from Corps, (B) visual observer teams, (C) reports from Reconnaissance Units, (D) fire of Infantry Units.

PROGRAM 5: THE LOGISTICAL PLAN

Supply economy is a function of

(A) Division Quartermaster, (B) Division G-4, (C) Command, (D) Division Ordnance Officer.

PROGRAM 6: THE HUMAN SIDE OF BATTLE

Direct responsibility for safeguarding prisoners of war lies with

(A) G-1, (B) the Provost Marshal, (C) the Adjutant General, (D) G-4.

PROGRAM 6: THE HUMAN SIDE OF BATTLE

World War II experience indicates that during three days of combat, an Infantry Rifle Company's losses from all causes may be expected to be

(A) between 9 and 12 per cent, (B) between 12 and 17 per cent, (C) between 17 and 24 per cent, (D) more than 24 per cent.

For the first program no script was available in time to permit preparation of tests, but a questionnaire to determine the attitude of reservists toward television instruction was administered at the conclusion of this program.

In the tests for Programs 2 to 8 a total of 234 test items was used. One hundred of these items were used for repeated testing, and each one appeared both in the pretest and in the final test for some one of the programs. Thirty-seven of these 100 items were also used for measuring retention and these items were presented for a third time after an interval of from one to six weeks.

The number of questions presented both before and after a particular lesson varied from 12 to 22 except for the seventh program which had only six items in the pretest. The seventh program consisted largely of illustrative and descriptive material which was specific to the conduct of this particular attack — material which could not be pretested fairly in any detail.

In the final test booklets for Programs 2 to 7, participants were invited to make free comments on the acceptability of the program. The final test booklet for the eighth program included a rating scale consisting of 21 items, on which reservists were asked to record their attitudes toward various aspects of television instruction.

E. TEST ADMINISTRATION

The tests, with directions for administering and for return shipment, were distributed through Army channels to Military District Commanders by Army Field Forces personnel. All tests were administered by the officer in charge of the various training groups. Thirty minutes immediately before each television session was allowed for the pretest and the same amount of time was allowed immediately after each session for the final test. These time limits permitted completion of the tests by all trainees.

F. SCORING PROCEDURE

All completed pairs of pretests and final tests were scored by means of stencils constructed from the scoring keys prepared with the help of advisors from the Army Command and General Staff College. The score on each test was the number of correct answers marked. To obtain measures of retention, response sequences of individuals were tabulated. These sequences were analyzed to show whether the individual marked a given item correctly or incorrectly on the pretest, correctly or incorrectly on the final test, and correctly or incorrectly on the delayed recall test. This type of analysis is quite time-consuming, and consequently it was considered desirable to use a representative sample of the total population tested, rather than to analyze response sequences for all trainees tested.

G. SUBJECTS

The trainees participating in this study constitute a sample of Army Field Force Reservists ranging from private to colonel, selected only on fortuitous factors. To be included in the sample for a given week, a reservist needed to:

a. belong to a training organization operating within television reception range of one of the stations which agreed to transmit the series of programs.

b. belong to a training organization that was successful in securing on a few days' notice one or more television receivers.

c. be in attendance during a particular telecast.

d. complete both pretest and final test.

For a given program, the sample was composed in part by individuals who had participated in all of the previous television sessions, and in part by reservists who had participated in varying numbers of the earlier television lessons. Officers were considerably more regular in attendance at consecutive training sessions than were enlisted men. However, the samples for the various weeks showed similar distributions of cases drawn from the various personnel categories.

More than 3000 reservists assembled for training each week in 160 viewing groups.* Tests were retained for scoring only if a complete pretest could be matched with a complete final test for the same individual. As shown in Table 1, from 2300 to 2600 complete sets of test papers were available for Programs 2 through 8, with

TABLE 1

COMPLETED SETS OF TESTS GIVEN BEFORE AND AFTER INSTRUCTION FOR GROUPS CLASSIFIED BY RANK AND BRANCH OF SERVICE

Category		Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
Field Grade	Arms	387	350	247	371	330	352	342
	Services	411	363	244	395	379	375	355
Company Grade	Arms	626	653	428	629	562	604	561
	Services	567	529	378	546	509	575	527
Sergeants	Arms	135	139	88	130	117	121	116
	Services	154	161	88	160	111	147	139
Other Enlisted	Arms	177	190	145	181	164	180	158
	Services	150	155	116	182	140	149	144
Total Group		2607	2540	1734	2594	2312	2503	2342

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* Programs were viewed by many military personnel in addition to those in the 160 television classrooms. Approximately 25,000 Army Field Force reservists within the television area were surveyed and it was found that more than 10 per cent viewed one or more of the programs, alone or in informal groups. Fourteen per cent of 14,400 National Guardsmen surveyed reported that they had viewed one or more of the *Command Post* lessons.

the exception of Program 4, where only 1734 usable pairs of tests were obtained because test distribution for that program was delayed by a rail embargo.

RESULTS

A. DID THE RESERVISTS LEARN FROM THE TELEVISION INSTRUCTION?

The total group of reservists showed a mean gain for each program in the score earned on the pretest items repeated after instruction. These mean gains were all statistically significant at the one per cent confidence level. Mean scores for the total group on pretest items before and after each of the programs are reported in Table 2. This table also reports standard deviations of the distributions of scores.

Although the mean gains were small numerically, the average improvement, considering all the programs, approximated one standard deviation of the distribution of pretest scores before instruction. In other words, the average viewer improved his score as a result of the instruction from a point where he exceeded 50 per cent of the group to a point where he exceeded 84 per cent of the scores earned before instruction. The fifth and sixth programs resulted in the largest mean increases in score relative to the variability of the group. For these programs the hypothetical average viewer increased his score after instruction from the initial 50 per cent point to a point where he exceeded 91 per cent of the scores earned before the lesson.

B. DO ALL RANKS IN HETEROGENEOUS GROUPS BENEFIT FROM A SINGLE LEVEL OF INSTRUCTION?

To determine whether the television programs were equally effective for all ranks, means and standard deviations were computed for scores on pretests and for scores on test items repeated after instruction, for each of eight personnel categories. These eight categories were composed of four classifications on the basis of rank, with each of these divided into "arms" and "services," as shown below:

Rank Classification

"Field Grade"	colonels, lieutenant colonels, majors
"Company Grade"	captains, first lieutenants, second lieutenants
"Sergeants"	all ranks of sergeants
"Other Enlisted"	corporals, privates first class, privates

TABLE 2

MEAN SCORES ON TESTS GIVEN BEFORE AND AFTER INSTRUCTION FOR GROUPS CLASSIFIED BY RANK AND BRANCH OF SERVICE

		PROGRAM 2					PROGRAM 3				
			Pretest		Repeated Items			Pretest		Repeated Items	
Category		N	M	SD	M	SD	N	M	SD	M	SD
Field Grade	Arms	387	8.4	1.8	9.3	1.5	350	12.9	2.0	15.4	1.6
	Services	411	7.5	1.8	8.9	1.5	363	11.8	2.5	14.7	2.0
Company Grade	Arms	626	7.7	1.7	9.1	1.4	653	12.3	2.0	14.9	1.7
	Services	567	7.3	1.8	8.8	1.3	529	11.6	2.3	14.5	1.9
Sergeants	Arms	135	6.8	1.8	8.2	1.8	139	10.4	2.4	13.4	2.5
	Services	154	6.3	1.8	8.0	1.8	161	9.9	2.5	12.5	2.6
Other Enlisted	Arms	177	5.8	1.8	7.4	2.0	190	9.4	2.7	11.9	2.9
	Services	150	5.8	1.7	7.6	1.9	155	8.8	2.9	11.8	3.0
Total Group		2607	7.3	1.9	8.7	1.6	2540	11.5	2.6	14.2	2.4

		PROGRAM 4					PROGRAM 5				
			Pretest		Repeated Items			Pretest		Repeated Items	
Category		N	M	SD	M	SD	N	M	SD	M	SD
Field Grade	Arms	247	13.2	2.8	15.8	2.4	371	8.5	2.4	11.9	1.8
	Services	244	11.2	2.9	14.6	2.8	395	8.0	2.5	11.4	2.3
Company Grade	Arms	428	12.6	2.7	15.5	2.3	629	7.6	2.2	11.5	1.9
	Services	378	11.2	2.9	14.4	2.5	546	7.3	2.5	11.2	2.1
Sergeants	Arms	88	10.2	3.2	13.6	3.0	130	5.0	2.1	9.2	2.4
	Services	88	9.1	2.9	11.9	3.2	160	5.2	2.4	8.8	2.5
Other Enlisted	Arms	145	8.7	3.2	11.5	3.6	181	4.8	1.9	8.1	2.6
	Services	116	8.8	2.7	11.5	3.6	182	4.4	2.0	7.8	2.7
Total Group		1734	11.3	3.2	14.3	3.1	2594	7.0	2.7	10.7	2.6

TABLE 2 (Cont.)

Category		PROGRAM 6					PROGRAM 7				
			Pretest		Repeated Items			Pretest		Repeated Items	
		N	M	SD	M	SD	N	M	SD	M	SD
Field Grade	Arms	330	8.1	1.9	11.5	1.7	352	4.8	1.1	5.3	0.7
	Services	379	7.9	1.8	11.0	2.0	375	4.5	1.2	5.1	0.9
Company Grade	Arms	562	8.0	1.9	11.3	1.8	604	4.7	1.2	5.2	0.9
	Services	509	7.7	1.9	10.7	1.8	575	4.4	1.2	5.1	0.9
Sergeants	Arms	117	6.9	1.9	9.8	2.1	121	4.0	1.3	4.8	1.0
	Services	111	7.2	2.1	9.5	2.5	147	3.6	1.3	4.7	1.1
Other Enlisted	Arms	164	6.0	2.1	8.7	2.3	180	3.5	1.5	4.3	1.3
	Services	140	6.0	1.9	8.5	2.4	149	3.4	1.5	4.5	1.3
Total Group		2312	7.6	2.0	10.6	2.2	2503	4.4	1.3	5.0	1.0

PROGRAM 8

Category			Pretest		Repeated Items	
		N	M	SD	M	SD
Field Grade	Arms	342	24.3	2.8	24.6	2.9
	Services	355	23.1	3.6	23.8	3.3
Company Grade	Arms	561	23.5	3.0	24.3	2.7
	Services	527	22.6	3.3	23.5	2.8
Sergeants	Arms	116	20.5	3.8	21.8	3.1
	Services	139	19.8	4.5	21.3	4.0
Other Enlisted	Arms	158	18.0	4.8	19.3	4.7
	Services	144	18.4	4.3	18.8	4.9
Total Group		2342	22.3	4.0	23.1	3.7

Arms

- Infantry
- Cavalry
- Field Artillery
- Coast Artillery
- Chemical Warfare Service
- Corps of Engineers
- Signal Corps

Services

- Adjutant General's Department
- Judge Advocate General's Department
- Quartermaster Corps
- Ordnance Department
- Medical Department
- Corps of Chaplains
- Corps of Military Police
- Finance Department
- Transportation Corps
- Inspector General's Department
- Women's Army Corps

Means and standard deviations of scores on pretests and on pretests repeated after instruction are given for each of the eight personnel categories in Table 2. Figure 3 presents in graphic form the mean scores for the eight personnel categories on the tests given before and after the sixth program, and is representative

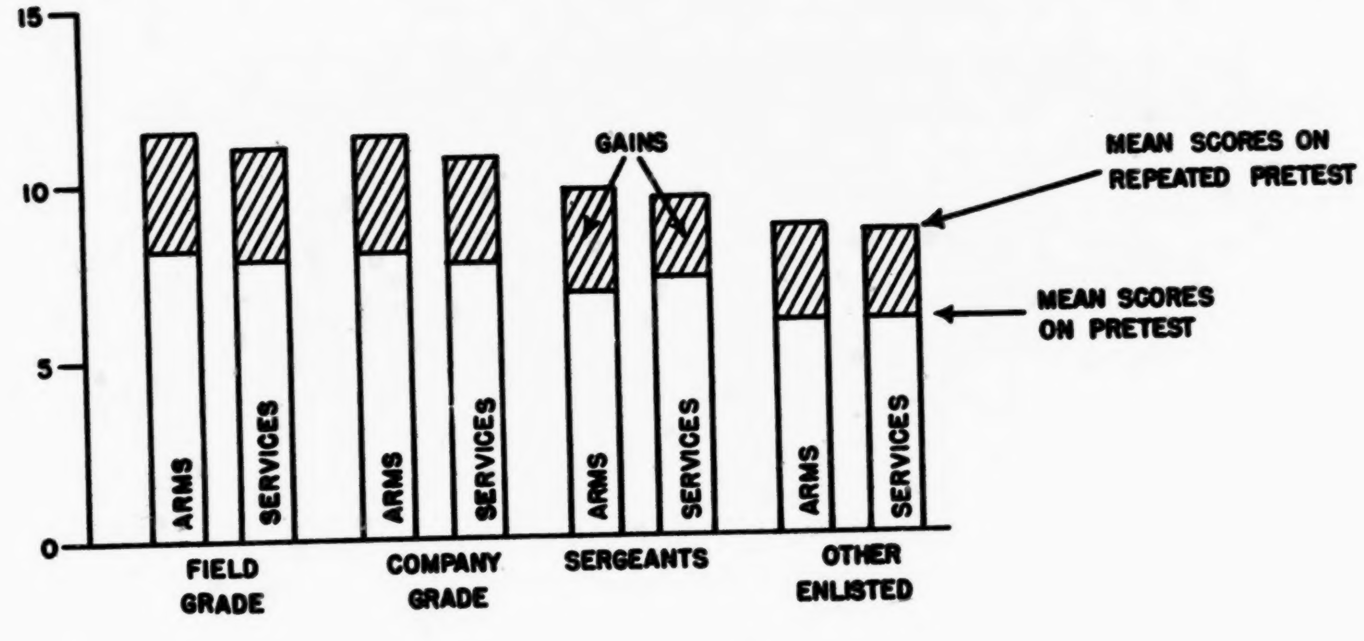


Figure 3. Mean Scores for Various Personnel Categories on Pretest and Repeated Pretest Items for Program 6.

of the findings for the other programs. Before instruction, the mean scores for reservists in the Field Grade, Company Grade, Sergeants, and Other Enlisted categories form a rather consistently descending scale for each program. Each grade of personnel in the Arms earned, on the average, a score which was slightly, but rather regularly, superior to the average score earned by the corresponding grade in the Services. These two gradients persisted in mean scores on tests repeated after instruction.

The mean gains made by each of the eight personnel categories for each of the seven programs were all statistically significant. For a given program the differences in gains made by the various ranks were relatively small. From program to program there was no regularity in the relative size of the gains made by the different personnel categories. Table 3 reports mean gains earned by categories grouped in a number of ways.

C. DO TRAINEES RETAIN WHAT THEY LEARN FROM TELEVISION INSTRUCTION?

Of the 100 items given immediately before and immediately after the program to which they pertained, 37 items were presented for a third time in a pretest booklet after an interval of from one to six weeks following the original testing. To determine the degree of retention over each interval, it was necessary to study the responses of individuals before instruction, after instruction and after the delay interval. A stratified sampling of the total tested population was drawn so that it would be representative of the entire participating reserve group in terms of grade, branch and Army area. In analyzing the response sequences for a single item, responses of all individuals in the stratified sample who had marked the item on the three occasions were tabulated. Hence, for that item, the per cent of correct responses before instruction, the per cent of correct responses immediately after instruction, and the per cent of correct responses after the one- to six-week interval could be calculated. For each of the 37 items, an average of approximately 600 complete sequences was obtained for officers, and approximately 350 complete sequences for enlisted men. Table 4 presents the increase in percentage of correct responses resulting from instruction, and for each of the three intervals, the percentage of this gain which was retained. Figures 4 and 5 present this same material in graphic form. For both officers and enlisted men, the degree of retention over periods of one week, two to four weeks, and five to six weeks was very high. Officers retained considerably more of the material learned as a result of instruction than did the enlisted men, either because of broader backgrounds, or because the instruction resulted in re-learning of partially forgotten material.

TABLE 3

MEAN GAINS ON TESTS GIVEN BEFORE AND AFTER INSTRUCTION FOR GROUPS CLASSIFIED BY RANK AND BRANCH OF SERVICE

Category		Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
Field Grade	Arms	0.9	2.5	2.6	3.4	3.4	0.5	0.3
	Services	1.4	2.9	3.4	3.4	3.1	0.6	0.7
Company Grade	Arms	1.4	2.6	2.9	3.9	3.3	0.5	0.8
	Services	1.5	2.9	3.2	3.9	3.0	0.7	0.9
Sergeants	Arms	1.4	3.0	3.4	4.2	2.9	0.8	1.3
	Services	1.7	2.6	2.8	3.6	2.3	1.1	1.5
Other Enlisted	Arms	1.6	2.5	2.8	3.3	2.7	0.8	1.3
	Services	1.8	3.0	2.7	3.4	2.5	1.1	0.4
Total Group		1.4	2.7	3.0	3.7	3.0	0.6	0.8
Field Grade Offs.		1.2	2.7	3.0	3.4	3.2	0.5	0.5
Co. Grade Offs.		1.4	2.7	3.1	3.8	3.1	0.5	0.8
Sergeants		1.6	2.8	3.1	3.9	2.7	0.9	1.3
Other Enlisted		1.7	2.8	2.7	3.3	2.6	1.0	0.9
Officer	Arms	1.2	2.6	2.8	3.6	3.3	0.4	0.6
	Services	1.6	2.9	3.3	3.7	3.1	0.7	0.8
Enlisted	Arms	1.5	2.7	3.0	3.6	2.8	0.8	1.3
	Services	1.8	2.9	2.6	3.5	2.4	1.1	0.9
TOTAL								
Officer		1.3	2.7	3.1	3.7	3.2	0.6	0.7
Enlisted		1.6	2.8	2.9	3.6	2.7	0.9	1.1
Arms		1.2	2.7	2.9	3.7	3.2	0.5	0.7
Services		1.6	2.8	3.2	3.6	2.9	0.8	0.8

TABLE 4

AMOUNT OF LEARNED MATERIAL RETAINED BY OFFICERS AND ENLISTED MEN OVER INTERVALS OF ONE WEEK, TWO TO FOUR WEEKS, AND FIVE TO SIX WEEKS

No. of Items Repeated after Indicated Interval	No. of Response Sequences Analyzed	Increase in Percentage of Correct Responses after Instruction	Interval between Instruction and Delayed Testing	No. of Percentage Points Lost over Specified Interval	Per Cent of Increase Retained over Specified Interval
			OFFICERS		
20	11,554	20.1	1 week	1.1	94.5
9	5,010	29.3	2-4 weeks	2.5	91.5
8	5,316	15.6	5-6 weeks	2.3	85.3
			ENLISTED		
20	6,985	17.5	1 week	3.4	80.6
9	2,729	29.9	2-4 weeks	6.4	78.6
8	2,899	18.7	5-6 weeks	6.5	65.2

The data are rather conclusive in indicating that not only did the reservists learn from the television instruction, but that they retained substantial amounts of the material over periods of three to six weeks.

D. WERE THE TRAINING PROGRAMS FAVORABLY RECEIVED BY THE RESERVISTS?

The rating scale and questionnaire marked by reservists after the eighth program showed that the series of television instructional sessions had been very favorably received by the great majority of those who viewed the programs. Completed rating forms were available for 1,979 officers and 619 enlisted men. Eighty-

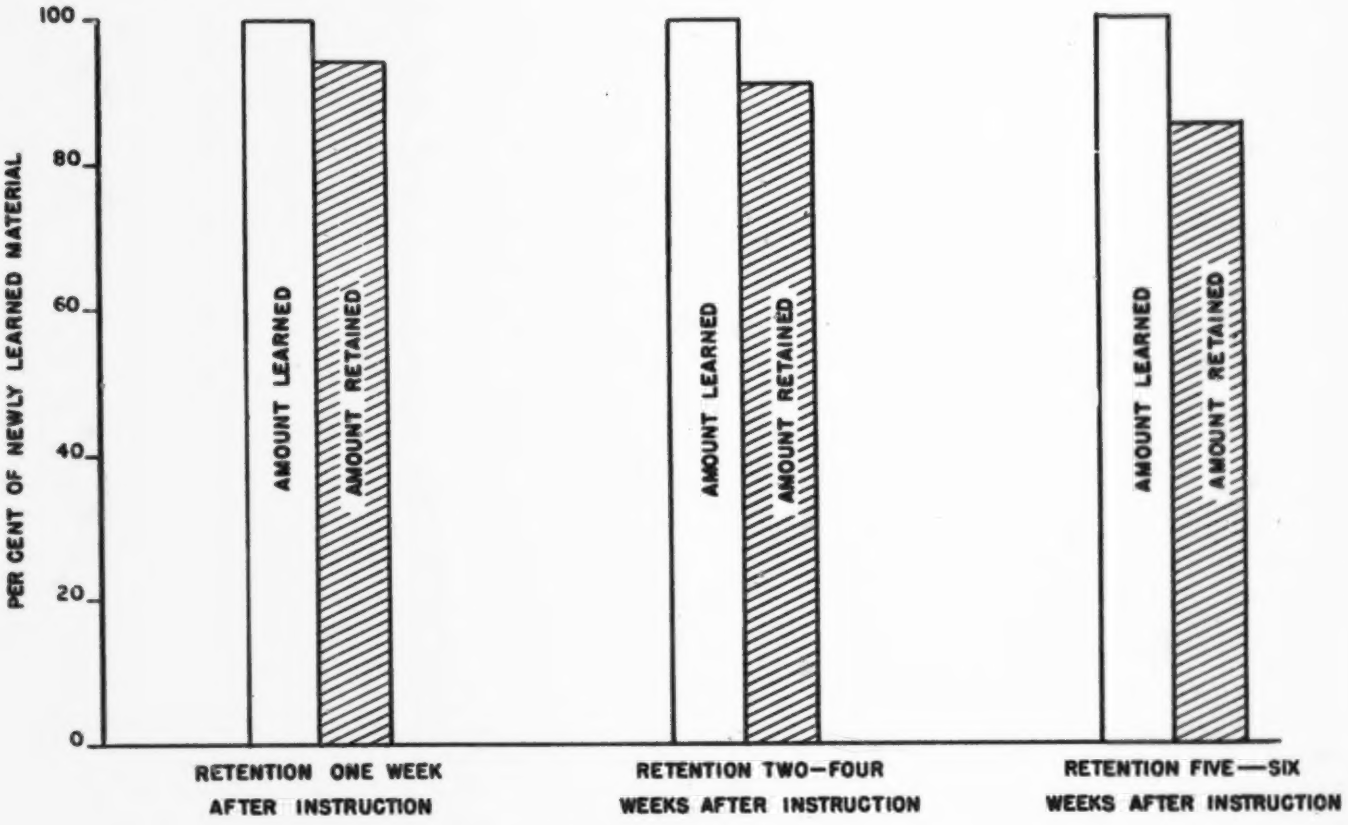


Figure 4. Percent of Learned Material Retained by Officers

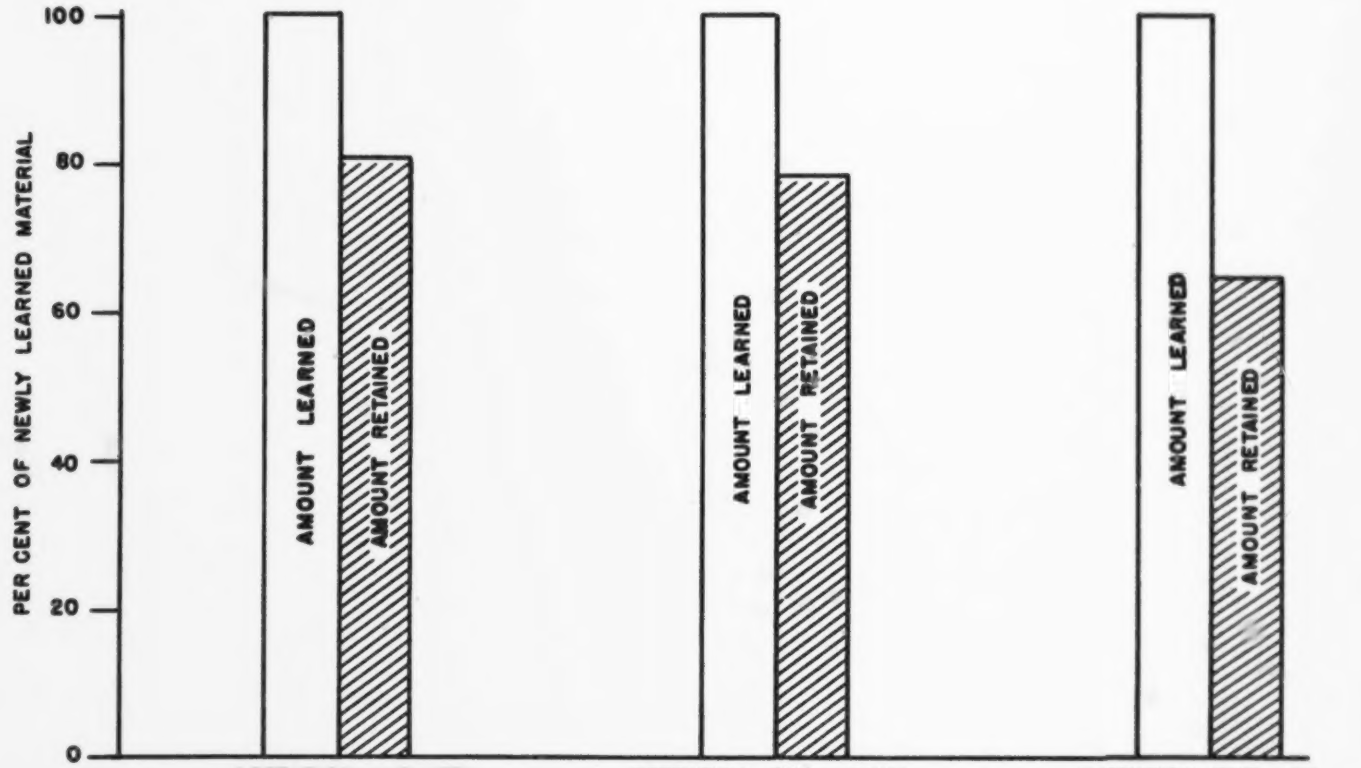


Figure 5. Percent of Learned Material Retained by Enlisted Men

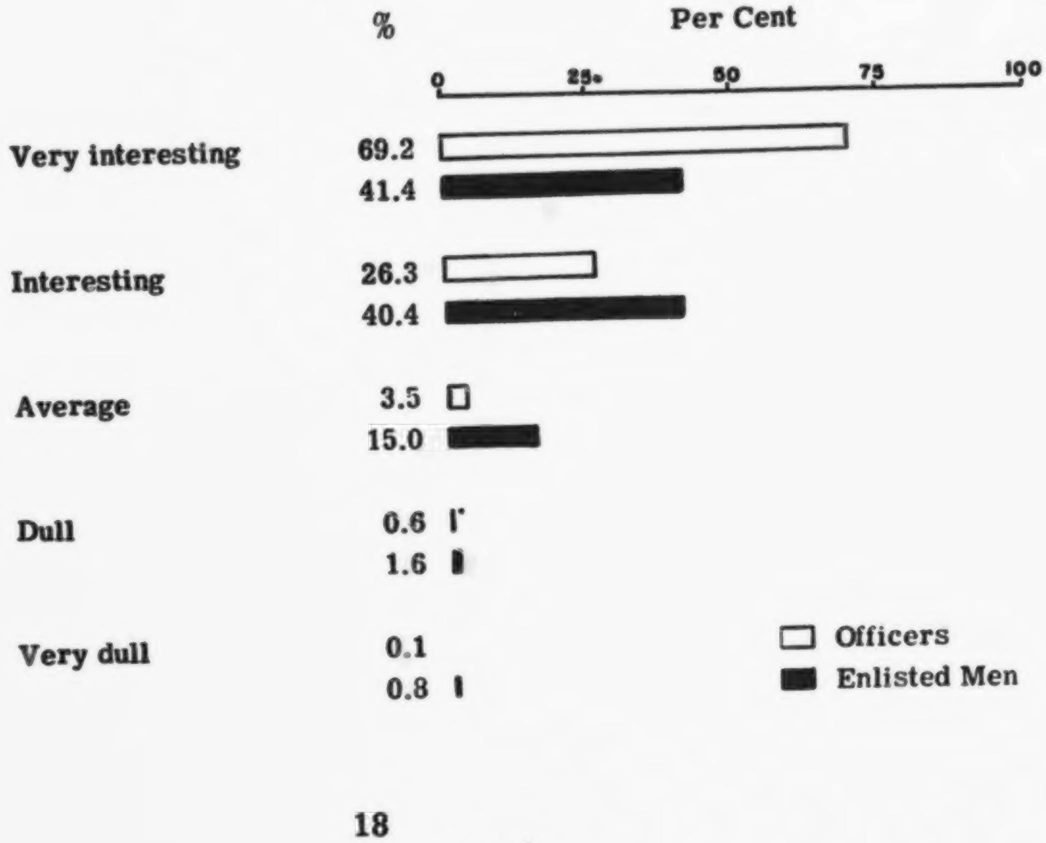
four per cent of those marking the rating form indicated they had viewed six or more of the programs and 39 per cent stated they had viewed the entire series.

The questions asked, the response alternatives provided, and the percentage of officers and of enlisted men indicating each of the responses are presented graphically on the following pages.

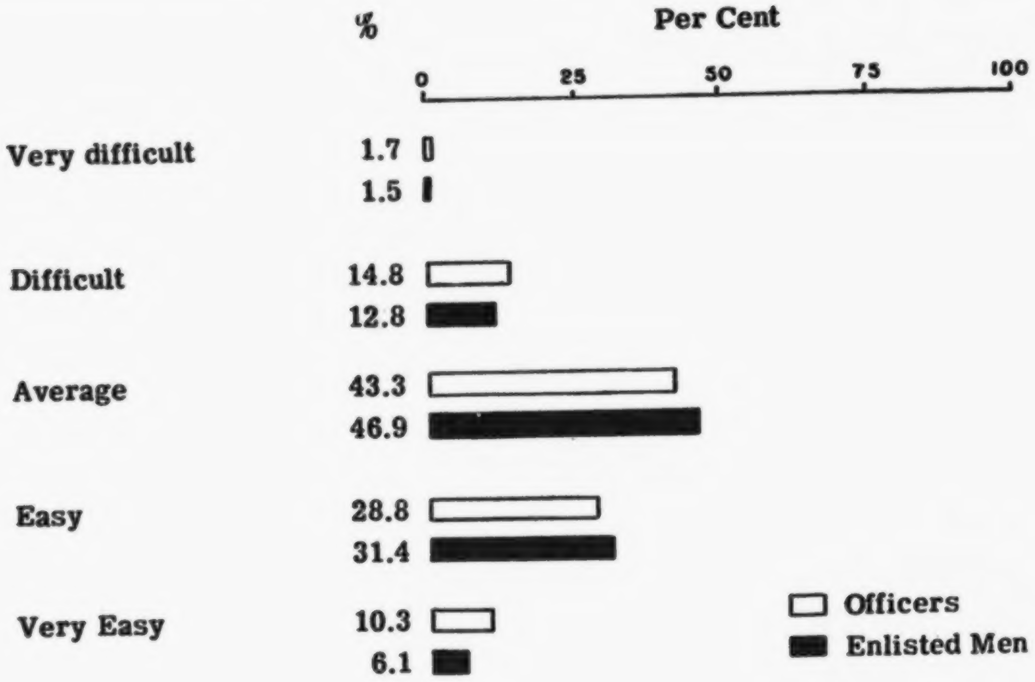
There was substantial agreement between the views expressed on the rating scale given after the first program and those indicated on the rating scale covering the whole series of programs and marked immediately after the eighth program. The only important change in attitude was in the direction of more favorable rating of the instructors for the later programs.

In addition to the rating scales presented at the close of the first and eighth programs, participants in each television lesson were invited to write, in a space provided in the post-test booklets, any comments they cared to make regarding the program just viewed. These comments were found to parallel rather closely the views expressed in the rating scales. The principal supplementary information supplied by the free comments was the opinion, expressed by about 10 per cent of the officers and 5 per cent of the enlisted men, that the long introductory or closing speeches by high-ranking officers were extraneous or poorly executed. The free comments on the first five programs included frequent complaints that the visual aids were poorly chosen or poorly presented.

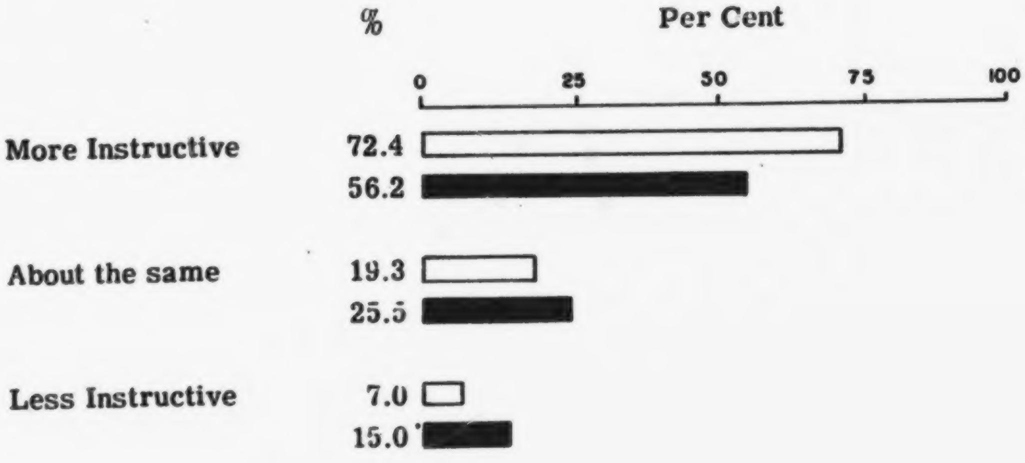
1. Compared to my other Reserve training periods, the television programs have been



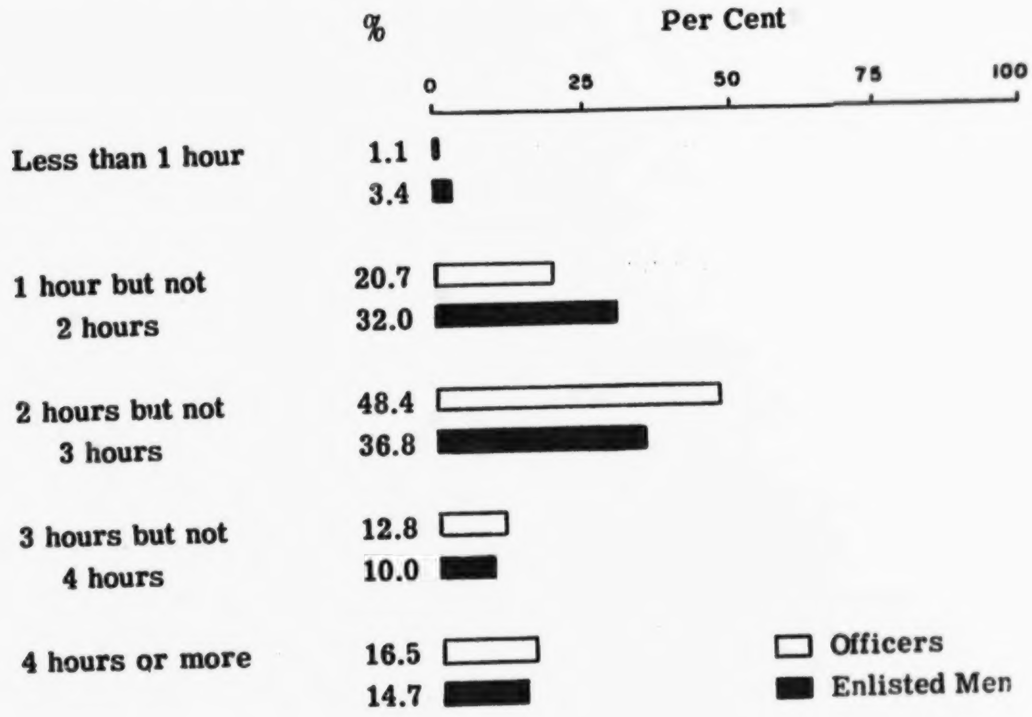
2. Compared to a typical Reserve training session, the television programs have been



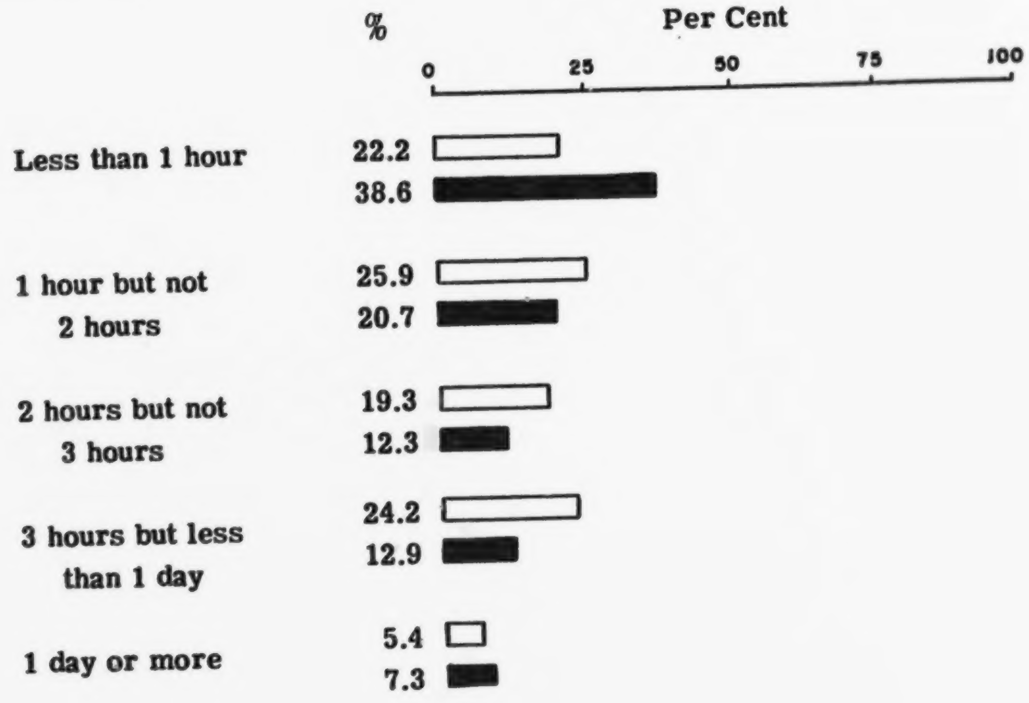
3. Compared to the average training films which I have seen within the past two years, the television programs were



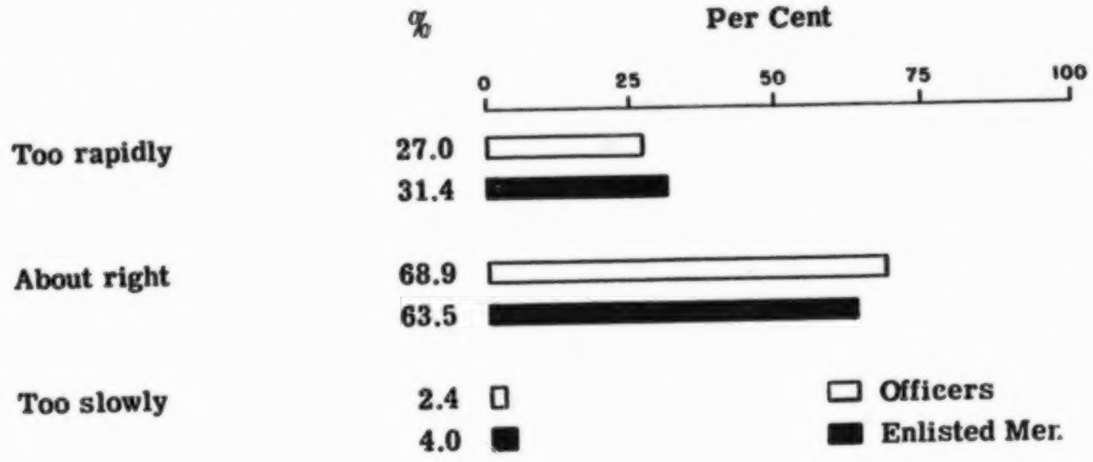
4. During a typical service training day, how many hours do you feel you could watch television?



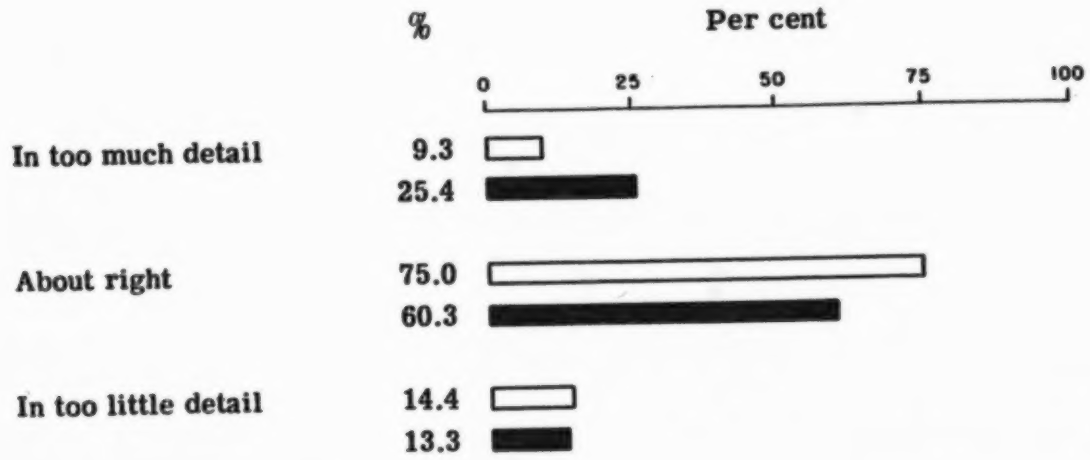
5. During a typical service training day, how long an interval do you feel would be necessary between television programs?



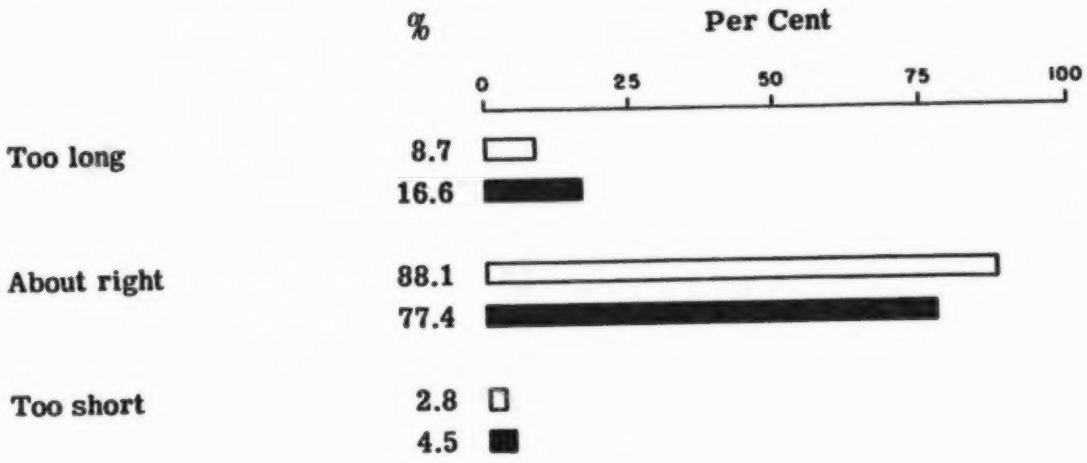
6. In general did you feel that the subject matter was presented



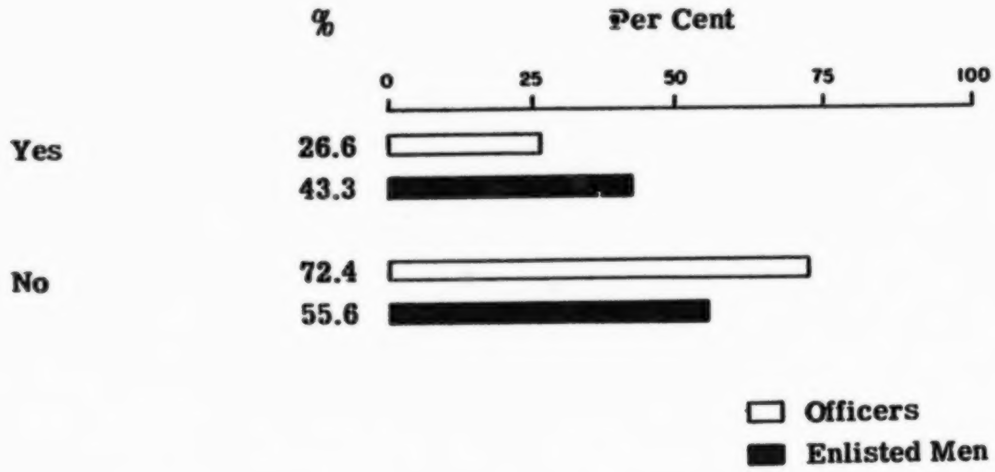
7. Did you feel that the subject matter was presented



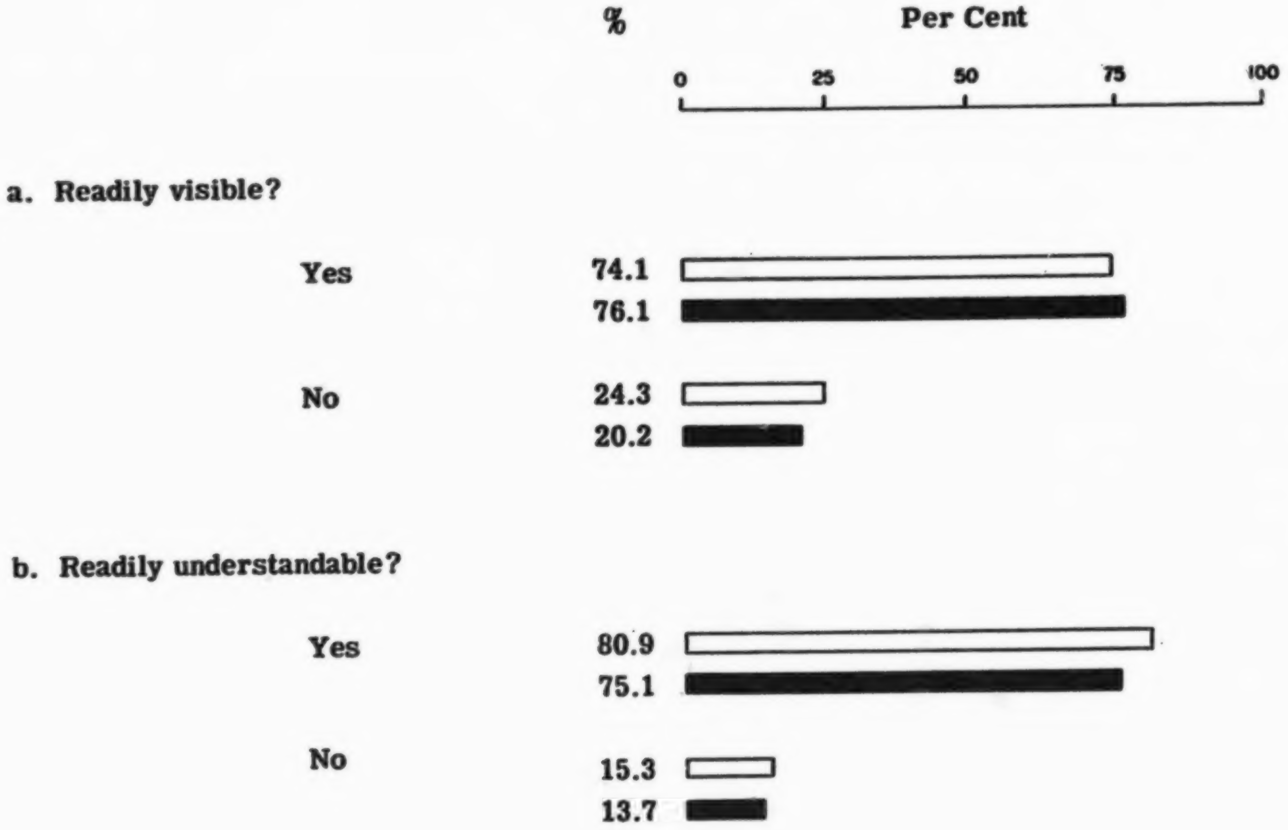
8. In general were the programs



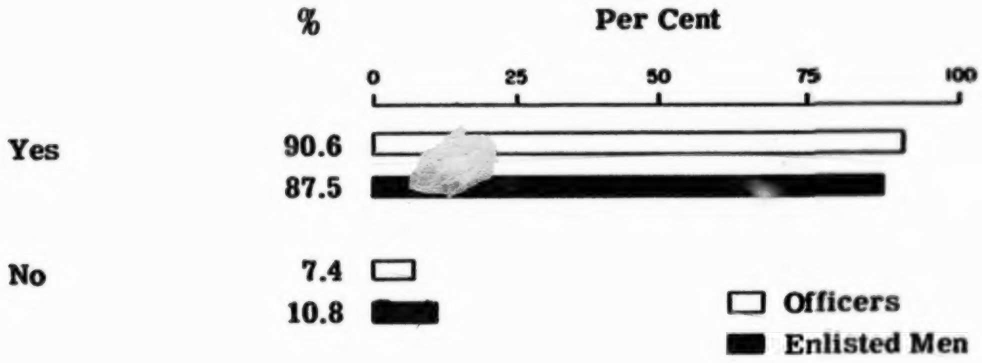
9. Do you think too many topics were covered in the typical program?



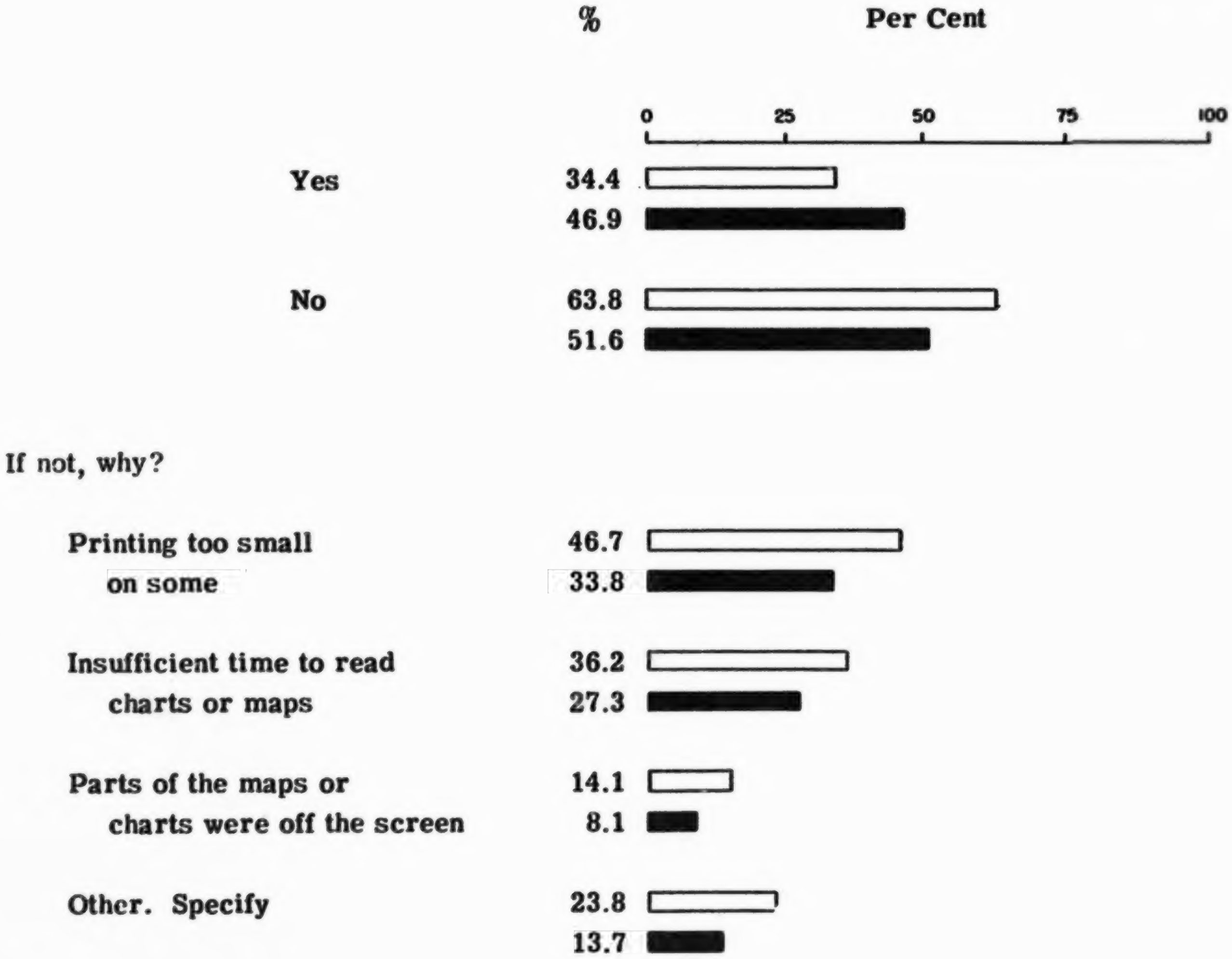
10. In the film sequences were the essential elements of the motion picture film used --



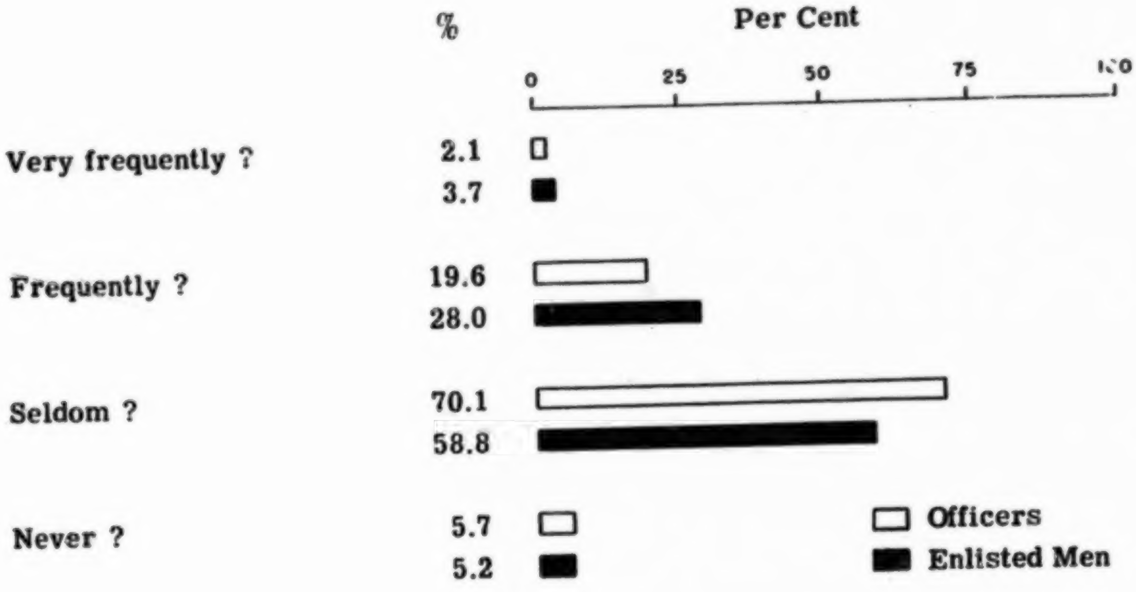
11. In general, did the motion picture film add to the understanding of the material?



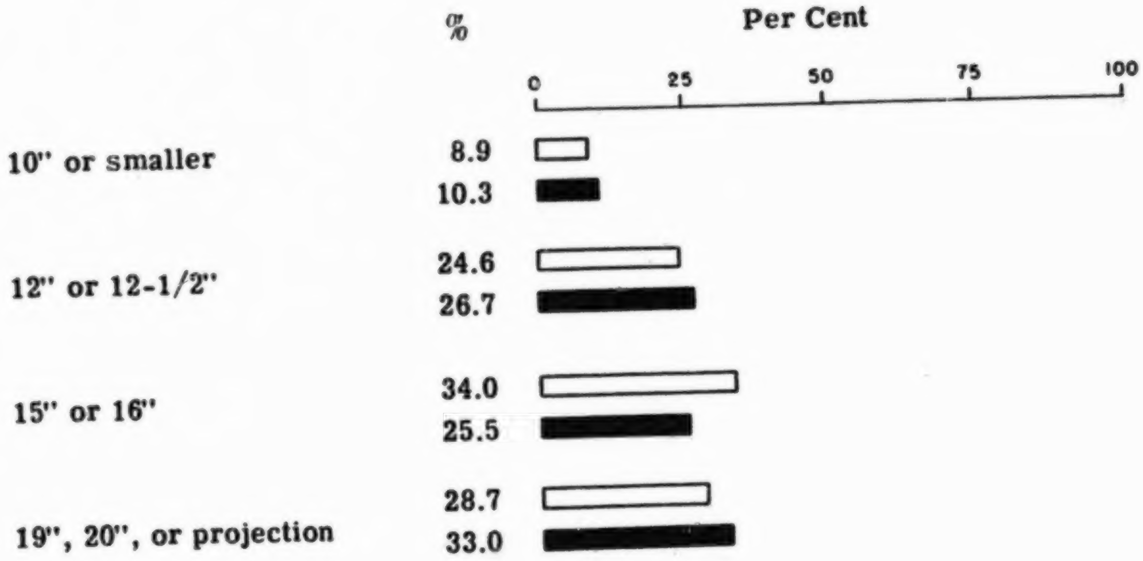
12. Where maps and charts were used, were the essential elements readily visible and understandable?



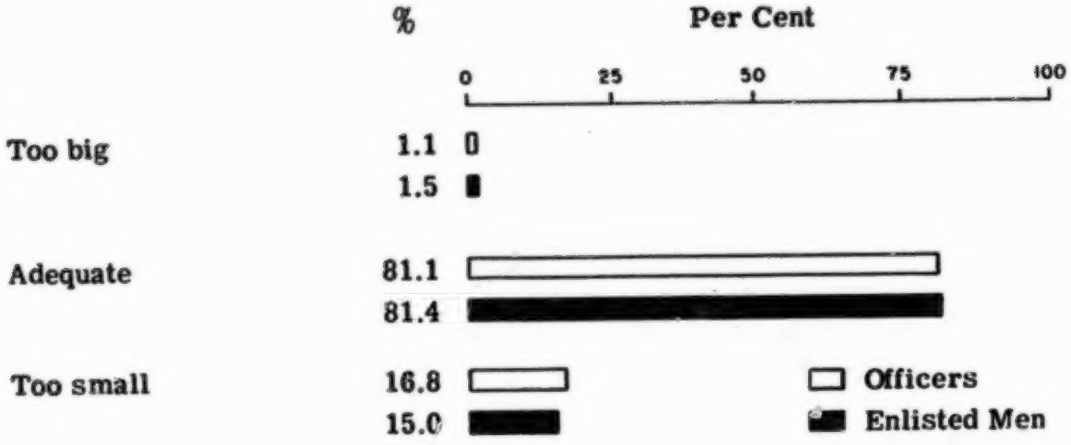
13. If you felt there were any instances where models, maps, or charts rather than the presence of the lecturer on the screen would have been more helpful in promoting understanding of the material, did this occur



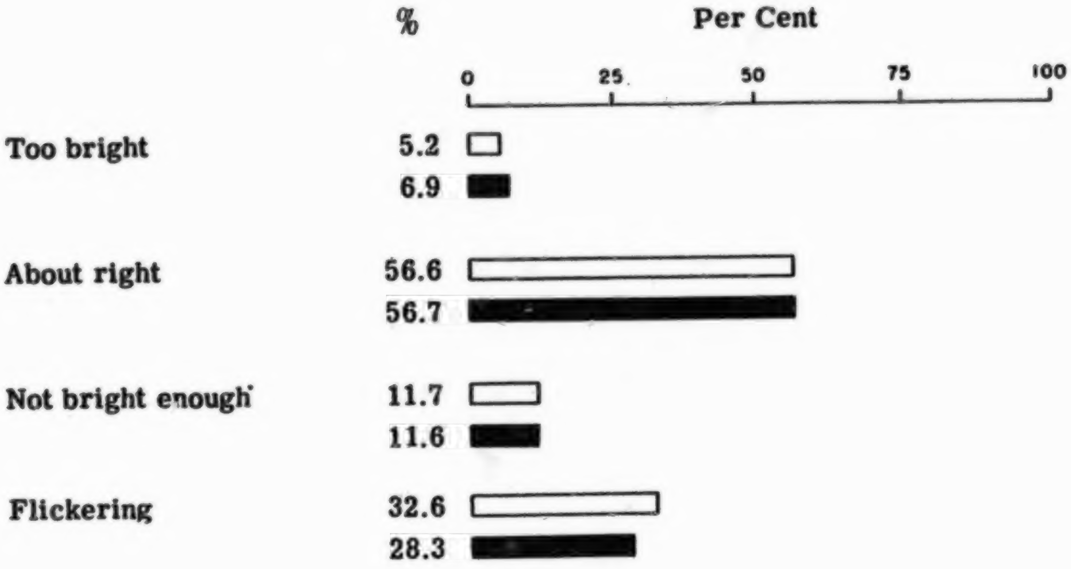
14. On what size television screen did you usually view the programs?



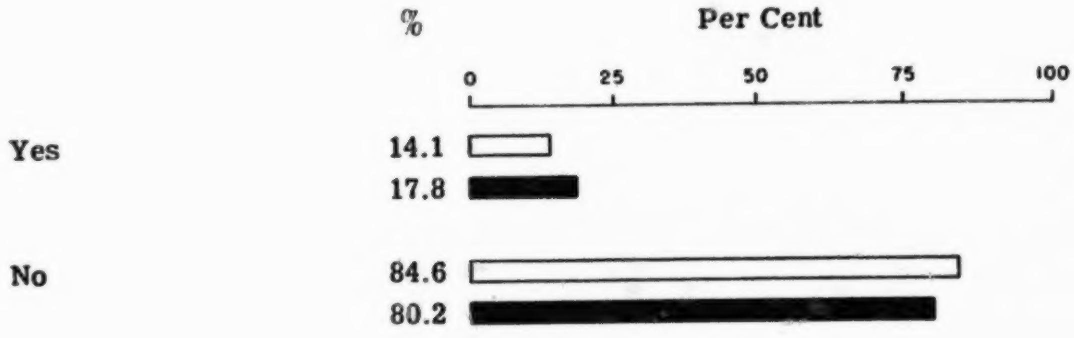
15. Was the television screen you usually viewed



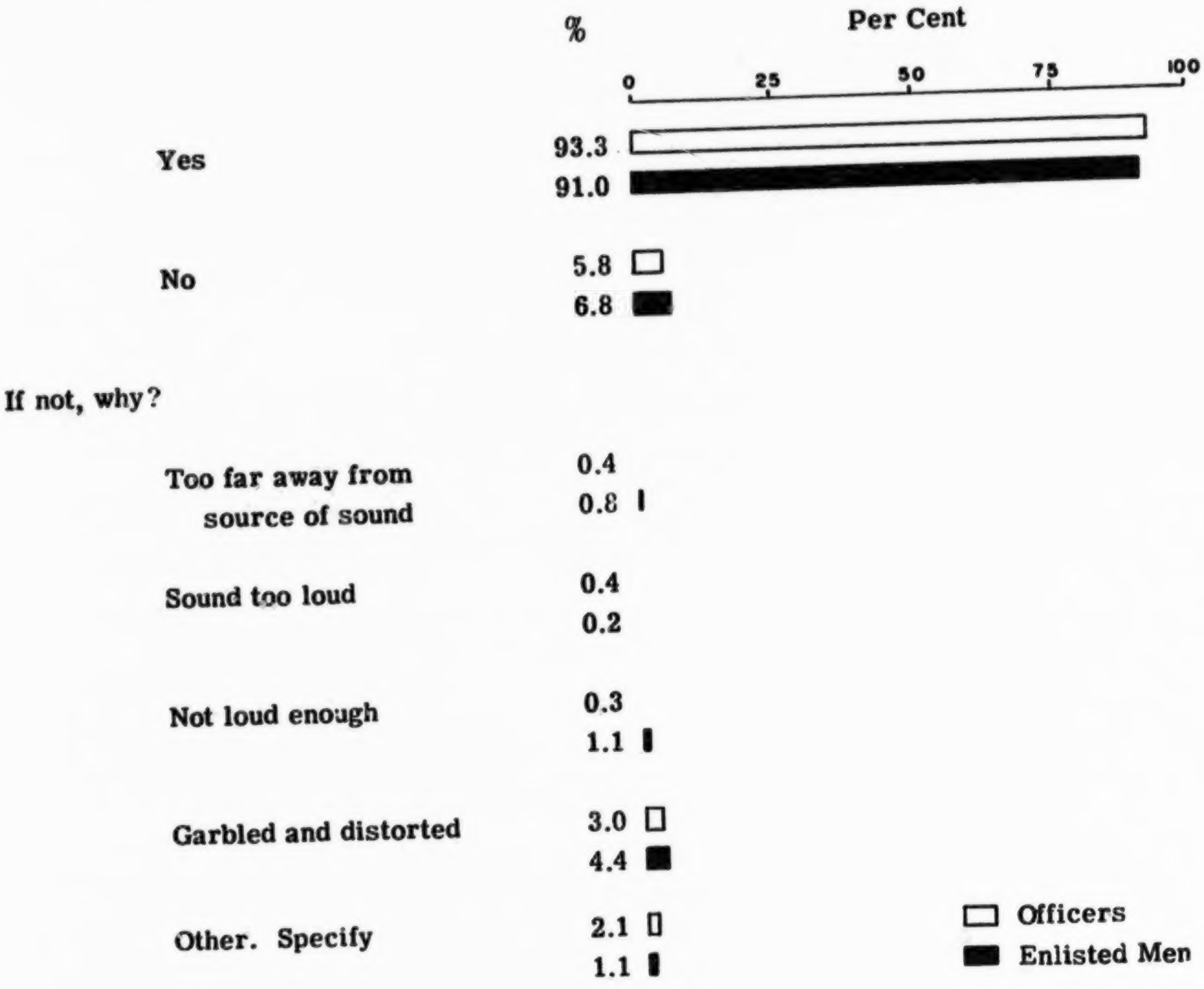
16. Did you feel that the illumination of the screen was, in general



17. In general, did you find that the room illumination interfered with your viewing of the screen?

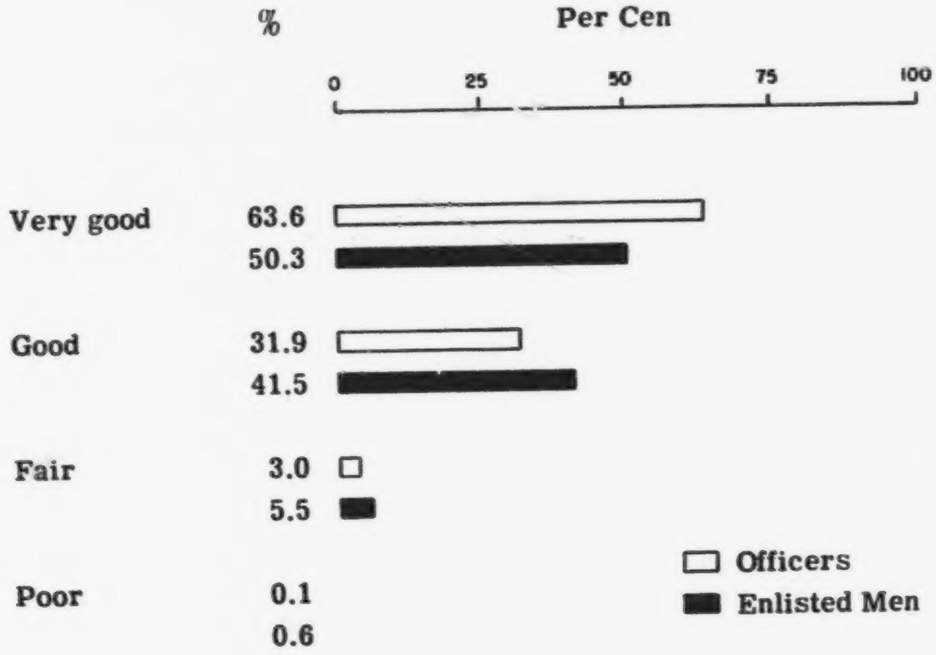


18. Were you usually able to hear the programs adequately?

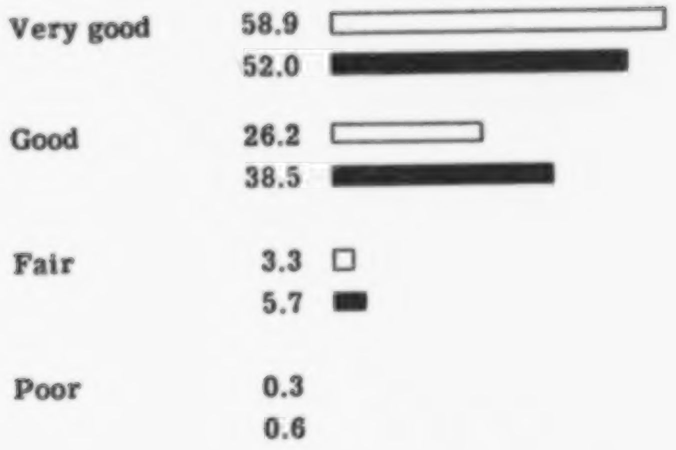


19. Give a composite (average or over-all) rating of the principal instructors in the programs with respect to the four following characteristics:

a. Personality



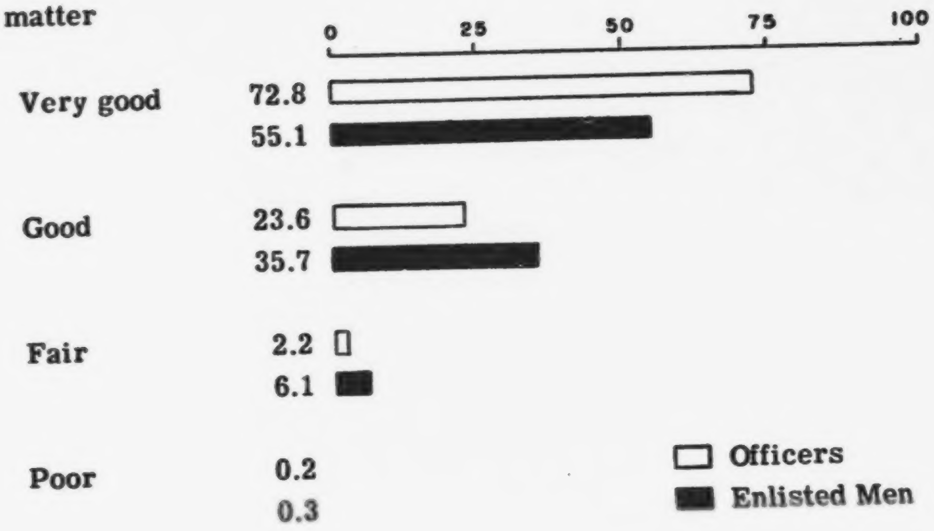
b. Speech characteristics



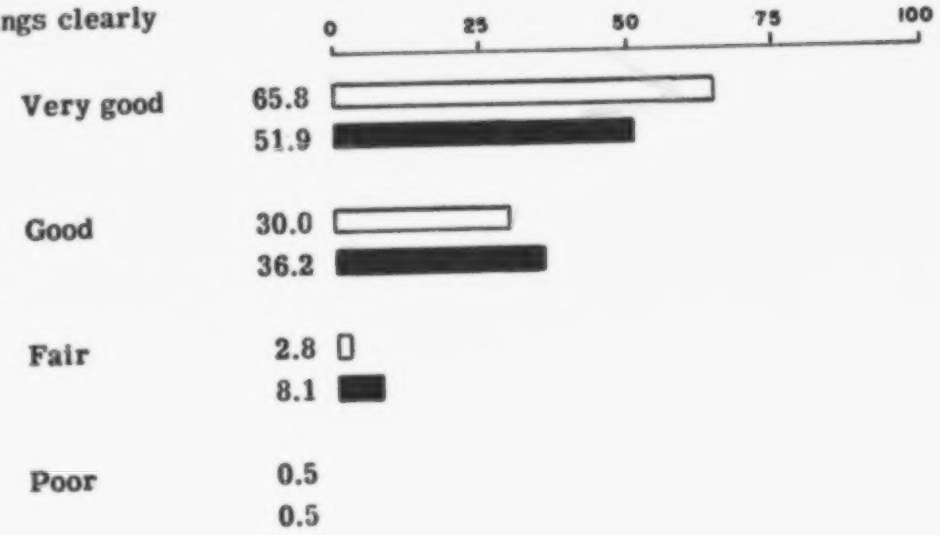
19. (cont)

% Per Cent

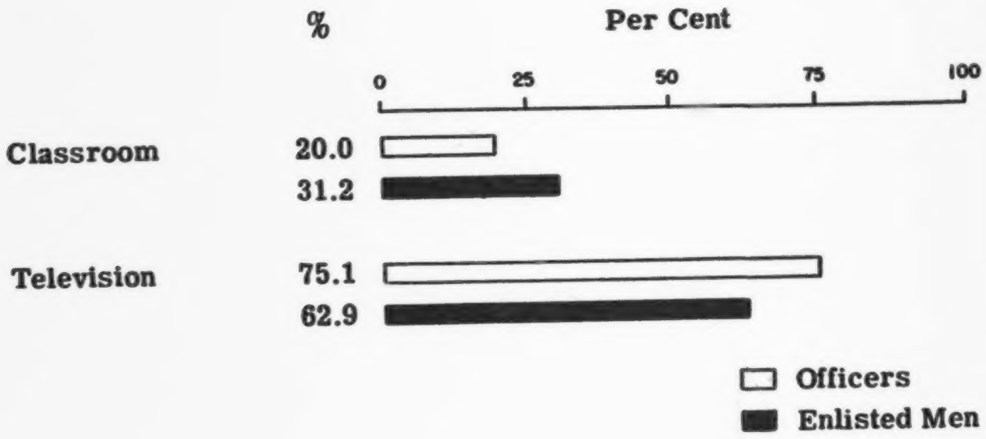
c. Command of subject matter



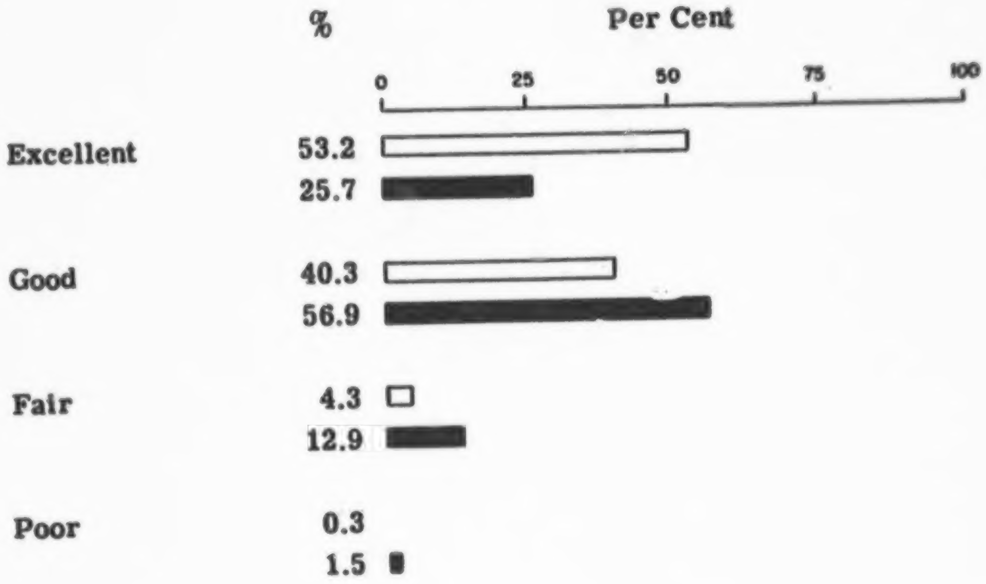
d. Ability to explain things clearly



20. Given the opportunity to receive similar instruction either in the classroom or via television, which would you choose?



21. What over-all rating would you assign the series of programs?



E. COMMENTS OF THE TRAINING EXPERTS

The programs were viewed and commented upon by twenty civilian and military training experts. They were almost unanimous in expressing the belief that there was steady and significant improvement in the quality of the programs as the series progressed. The following statements summarize the most significant observations of the training experts:

1. Changing emphasis in later programs from dramatics to illustrated narration improved the instructional quality of the lessons.
2. Material was well presented in general, but content was more suitable for higher ranking officers.
3. Too many topics were covered in most of the programs.
4. The purpose of the instruction was not clearly defined. The over-all or general instruction was mixed too much with the specific, and the program became an orientation course and a technical course combined.
5. The introductory and closing speeches by high-ranking officers were, with few exceptions, too long, quite boring, poorly reproduced, and detracted from the instructional value of the programs. Public relations objectives of these speeches appeared to be mixed with troop-incentive objectives and neither purpose was effectively realized. Future training programs need to find better techniques for exploiting the prestige of high-ranking officers.

F. WHAT EFFECT DOES THE DEGREE OF EXPLICITNESS OF TREATMENT OF TOPICS HAVE UPON THE LEARNING OF THE TOPICS?

Kinescope recordings of Programs 2 to 8 were used to correct "final" scripts so that they corresponded exactly with the procedure actually followed in the television instructional sessions. As earlier stated, there was a total of 100 items included in the tests for Programs 2 to 8, which had been presented immediately before and immediately after a program in which preliminary scripts had indicated that the topics upon which items were based would be treated instructionally. The corrected scripts and the kinescope recordings were then used to determine the degree of explicitness of the instructional treatment accorded each of the topics underlying the 100 test items.

The instructional treatment of a topic was rated as "explicit" if the meaning was brought out definitely in words, or plainly expressed either by graphics or by a dramatic sequence. A treatment was classified as "sketchy" if the program content relating to a topic was scattered, diffuse, or indirect, or which required one or more inferences on the part of the viewer to extract implicit meanings. A topic was considered to be "not covered" if analysis of the script and viewing of the kinescope recording failed to reveal any pertinent treatment of the topic.

Two staff members, operating independently, assigned ratings of "explicit," "sketchy," or "not covered" to the treatment given each of the 100 test items. If the two raters disagreed on the coverage of any item, the portions of the kinescope recording and the script dealing with the item in question were reviewed a third time by an additional staff member. After discussing the item, its treatment in the script, and the presentation on the screen, this group of judges arrived at a decision concerning the degree of explicitness of treatment. There was, in general, close agreement by the raters. A total of 67 items were found to have been explicitly treated, 14 had been given a sketchy treatment, and 19 items were not directly covered in the television presentation.

A stratified sample of officers was selected in such a way that the proportion of each grade and branch in each Army area in the sample corresponded to the percentage of that grade and branch in each Army area contained in the total population tested. A stratified sample of enlisted men was similarly formed. The size of these samples was set high enough so that for each item a minimum of 250 response sequences (i.e., the responses of the same individuals before and after instruction) for officers and a like number of response sequences for enlisted men were available for tabulation. On the average, 350 response sequences were secured for officers and 275 response sequences for enlisted men. For these stratified samples, mean percentages of correct responses before and after instruction on each of the 67 explicitly treated items were determined. Similar determinations were made for the 14 sketchily treated items and the 19 items not covered in the television sessions.

Data for all the items included within a given treatment category were combined. Table 5 reports the obtained combined percentage of correct response before and after instruction, and Figure 6 presents the same data graphically. On the average, large and significant gains were made on those items which had been explicitly treated in the television sessions. Items sketchily treated or not directly covered both showed small mean gains. It is possible that the slight gains made on items for which no direct treatment could be found, resulted from learning or reinforcement of related material, or from reduction of the likelihood of one of the wrong alternatives being selected.

TABLE 5

PERCENTAGES OF CORRECT RESPONSES FOR REPEATED ITEMS GROUPED BY DEGREE OF EXPLICITNESS OF TREATMENT

Degree of Explicitness	No. of Items	Group	No. of Response Sequences Analyzed	Percentages of Correct Responses		Gains in Percentage Correct
				Before Instruction	Immediately After Instruction	
Explicit	67	Officers	25213	60.6	82.6	22.0
		Enlisted	19060	52.9	68.4	15.5
		Total	44273	57.3	76.5	19.2
Sketchy	14	Officers	4601	75.7	76.7	1.0
		Enlisted	3744	57.9	61.4	3.5
		Total	8345	67.7	69.8	2.1
Not Covered	19	Officers	5675	59.9	61.8	1.9
		Enlisted	4945	50.2	52.6	2.4
		Total	10620	55.4	57.5	2.1

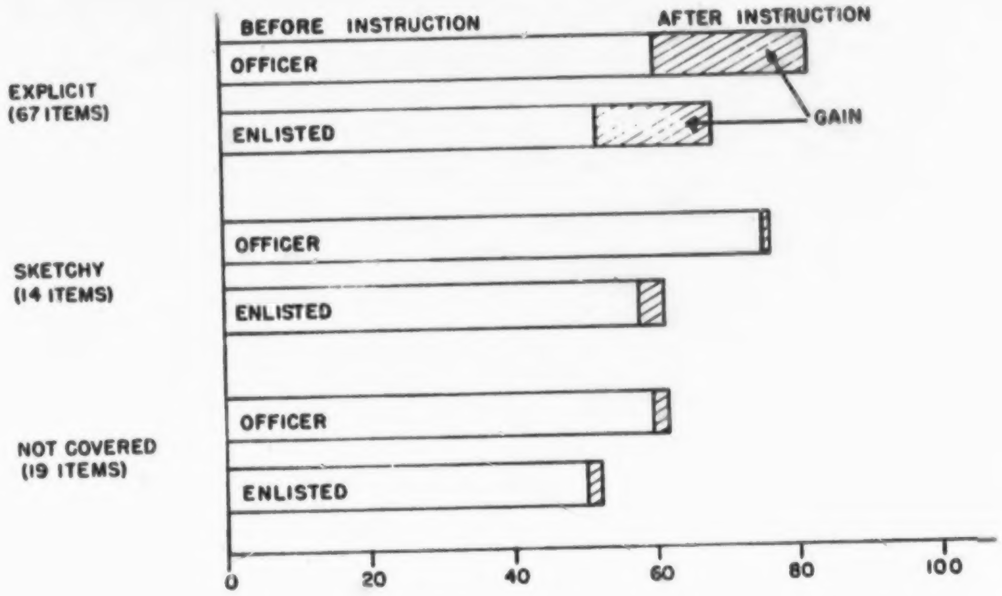


Figure 6. Percentages of Correct Responses for Items Given Before and After Instruction Grouped by Coverage in Program

Table 6 reports the percentage of items receiving each of the three degrees of explicitness of treatment which showed, after instruction, significant gains or losses, or non-significant gains or losses. Considering data from the officer sample, it was found that 81 per cent of the items given explicit treatment showed statistically significant increases in the percentage of correct responses following instruction; 4 per cent of the explicitly treated items showed significant losses. For the officer group 29 per cent of the sketchily treated items showed significant gains, and 14 per cent of them showed significant losses; 16 per cent of the items not treated showed significant gains, and 11 per cent of them showed significant losses in per cent of correct responses following instruction. A rather similar picture is shown by the data for the enlisted men. Seventy-nine per cent of the explicitly treated items showed significant gains, and only 4 per cent showed significant losses. For the sketchily treated items, 21 per cent showed significant gains, and 14 per cent significant losses. Twenty-six per cent of the items not covered showed significant gains, and 16 per cent of them showed significant losses.

G. DOES THE TYPE OF INSTRUCTIONAL TREATMENT GIVEN A TOPIC INFLUENCE THE AMOUNT OF LEARNING?

Kinescope recordings of the eight one-hour programs were analyzed to determine the relative amounts of program time devoted to each of five types of activities:

TABLE 6

PERCENTAGE OF ITEMS GIVEN EXPLICIT TREATMENT, SKETCHY TREATMENT, OR NO COVERAGE WHICH SHOWED AFTER INSTRUCTION SIGNIFICANT GAINS, NON-SIGNIFICANT GAINS, NON-SIGNIFICANT LOSSES, AND SIGNIFICANT LOSSES

			Percentage of Items Receiving Indicated Treatment which after Instruction Showed:			
Degree of Explicitness	No. of Items	Group	Significant Gain	Non-significant Gain	Non-significant Loss	Significant Loss
Explicit	67	Officers	81	11	4	4
		Enlisted	79	8	9	4
Sketchy	14	Officers	29	21	36	14
		Enlisted	21	29	36	14
Not Covered	19	Officers	16	47	26	11
		Enlisted	26	37	21	16

(a) opening, intermission and closing, (b) speeches by ranking officers, (c) narration with or without film, (d) atmospheric, or "scene setting" film without narration, and (e) dramatized action. The percentages of each hour consumed by each of these activities are reported in Table 7. It is to be noted that as the series progressed, the amount of drama decreased and the amount of narration increased.

Kinescope recordings and corrected scripts were also analyzed to determine the type of instructional activity which had been used to convey information about the topics tested by the 100 items discussed in the preceding section. When the subject matter was treated by actors in dramatic sequences, the type of treatment was classified as drama; when an instructor presented information in the form of a lecture, the treatment was classified as narration. If film accompanying explanations by the narrator was judged to convey meaning by itself, or to amplify the meaning conveyed by the narrator, the treatment was termed narration with meaning-conveying film. In this series of programs, the only film judged to convey meaning, as described above, happened to be animated film. Where narration was accompanied by film whose function was to "set a scene" rather than to supplement the meanings conveyed by the narration, the treatment was classed as narration with atmospheric film. A few of the topics were given both dramatic treatment and some type of narration, and this category has been labeled drama combined with some type of narration. Percentages of correct responses before and after instruction for each of the five types of treatment are given in Table 8 and Figure 7.

TABLE 7

PERCENTAGE OF PROGRAM TIME IN EACH SESSION
DEVOTED TO SPECIFIED KINDS OF ACTIVITIES

Program	Opening, Intermission, Closing	Speeches	Narration With or Without Film	Atmospheric Film Without Narration	Drama
1	3.5%	28.1%	29.8%	1.8%	36.8%
2	11.0	22.7	34.8	10.7	20.8
3	11.3	8.2	25.1	5.4	50.0
4	6.2	10.8	38.0	5.5	39.5
5	8.4	6.7	47.2	1.3	36.5
6	4.4	17.7	41.5	3.0	33.3
7	4.6	9.3	52.5	15.3	18.3
8	5.3	12.2	58.2	11.3	12.9

TABLE 8

PERCENTAGES OF CORRECT RESPONSES FOR REPEATED ITEMS GROUPED BY TYPE OF TREATMENT

Type of Treatment	No. of Items	Group	No. of Response Sequences Analyzed	Percentages of Correct Responses		Gains in Percentage Correct
				Before Instruction	Immediately After Instruction	
Narration	27	Officers	9845	59.1	80.9	21.8
		Enlisted	7538	47.4	69.2	21.8
		Total	17383	54.0	75.8	21.8
Narration with Atmospheric Film	16	Officers	5165	67.4	82.4	15.0
		Enlisted	4285	55.6	68.2	12.6
		Total	9450	62.0	76.0	14.0
Narration with Meaning-Conveying Film	5	Officers	1652	52.4	87.0	34.6
		Enlisted	1344	36.0	69.6	33.6
		Total	2996	45.0	79.2	34.2
Drama	24	Officers	9521	66.3	77.9	11.6
		Enlisted	7045	50.7	62.2	11.5
		Total	16566	59.7	71.2	11.5
Drama Combined with Some Type of Narration	9	Officers	3631	62.7	90.6	27.9
		Enlisted	2592	43.9	72.6	28.7
		Total	6223	54.9	83.1	28.2

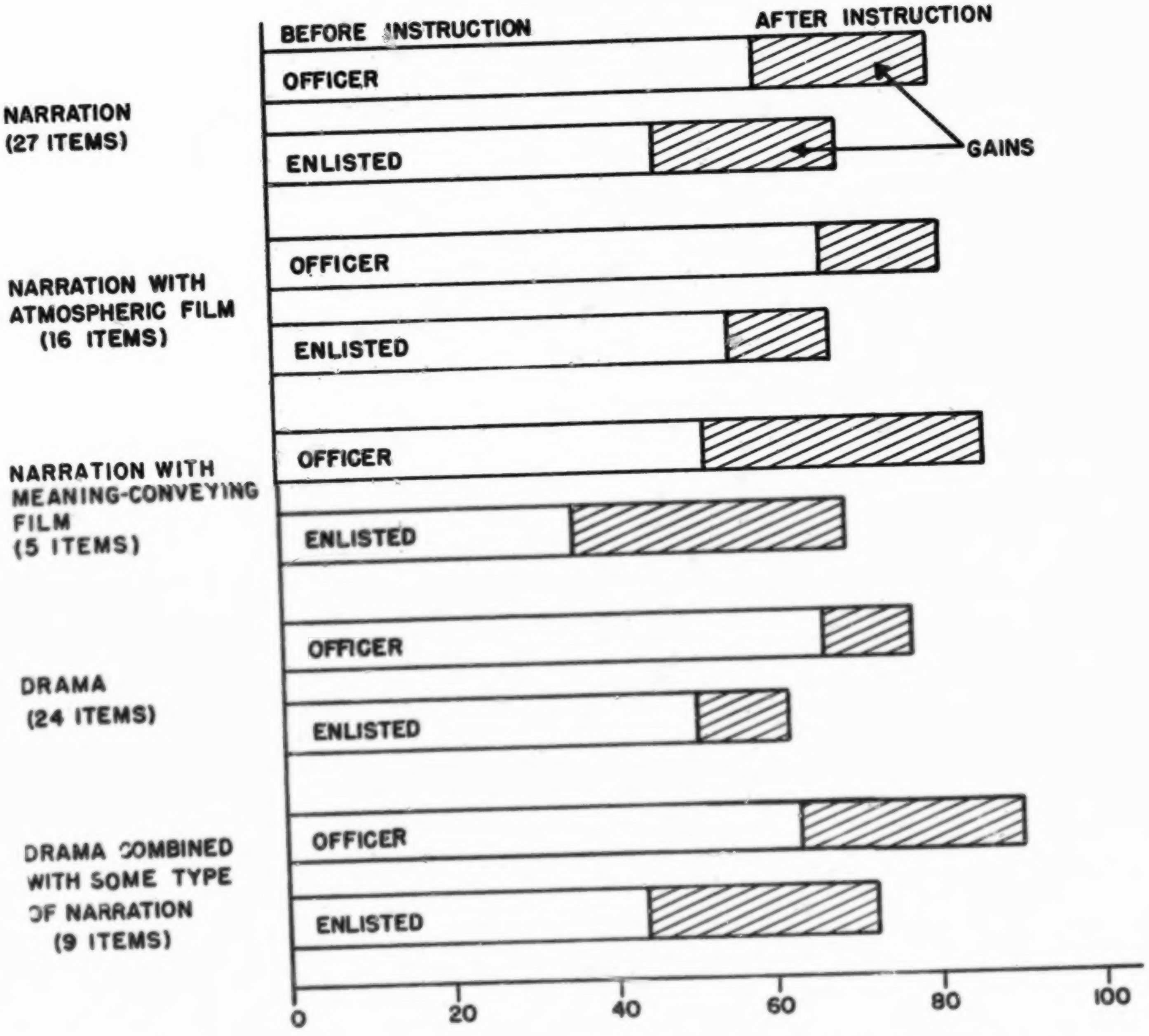


Figure 7. Percentages of Correct Responses for Items Given Before and After Instruction Grouped by Type of Treatment

All types of treatment produced an increase in knowledge. Narration by itself or in combination was found to be extremely effective. The largest percentage increase in knowledge was found for those items treated by narration accompanied by meaningful film. Dramatic treatment by itself brought about smaller improvement than any of the other types of treatment recognized. However, items given dramatic treatment and also treated by some form of narration showed large mean gains.

Table 9 reports the percentage of items given each type of treatment which showed after instruction (a) significant gains, (b) non-significant gains, (c) non-significant losses, and (d) significant losses. All five of the items treated by narration with animated film showed statistically significant gains for both officer and enlisted personnel. Eight of the nine items treated by drama combined with some type of narration showed significant gains for both officers and enlisted men. On the 27 items treated by narration alone, officers showed significant gains on 20, and enlisted men significant gains on 19. It is interesting to note that the lower percentages of significant gains found for items treated by narration with atmospheric film or by drama are associated with small, but rather disturbing percentages of

TABLE 9

PERCENTAGE OF ITEMS GIVEN EACH TYPE OF TREATMENT WHICH SHOWED, AFTER INSTRUCTION, SIGNIFICANT GAINS, NON-SIGNIFICANT GAINS, NON-SIGNIFICANT LOSSES, AND SIGNIFICANT LOSSES

			Percentage of Items Receiving Indicated Treatment which after Instruction Showed:			
Type of Treatment	No. of Items	Group	Significant Gain	Non-significant Gain	Non-significant Loss	Significant Loss
Narration	27	Officers	74	18	8	0
		Enlisted	70	18	8	4
Narration with Atmospheric Film	16	Officers	63	19	12	6
		Enlisted	69	0	19	12
Narration with Meaning-Conveying Film	5	Officers	100	0	0	0
		Enlisted	100	0	0	0
Drama	24	Officers	58	13	13	16
		Enlisted	50	21	21	8
Drama Combined with Some Type of Narration	9	Officers	89	11	0	0
		Enlisted	89	0	11	0

items for which significant losses were found. Considering both significant and non-significant losses for these two types of treatments, there is more than a suggestion that confusion was aroused by the treatment accorded some topics.

H. EXAMPLES OF EFFECTIVE AND INEFFECTIVE INSTRUCTIONAL TREATMENTS

Effective and ineffective instructional procedures show characteristic differences. Clear, direct handling of a topic can usually be distinguished at the script stage of production from one which is indirect, vague, or ambiguous. But to make the distinction, one must be actively concerned with meanings rather than with the development of a "show" designed to fill an hour of broadcast time. Script writers and producers, left to their own devices, tend to lose sight of the objectives of instruction. The psycho-educational specialist has an important role to play in the production of effective instructional sessions.

As an example of what may be accomplished by good television instruction, the learning and retention records of several hundred officers and enlisted men for a single item are presented together with a description of the treatment accorded this topic. The following item (12P4) was included in the pretest for Program 4:

> Tactical Air Control Parties are used to*
>
> (A) guide aircraft to the proper targets, (B) coordinate Anti-Aircraft Automatic Weapons fire, (C) control the type of attack made by aircraft on Aggressor positions, (D) coordinate the flights of the Organic Division liaison aircraft.

The function of Tactical Air Control Parties was explicitly treated in the fourth program. The type of treatment given the topic was narration with scene-setting or atmospheric film combined with drama. The identical test item was repeated in the final test following Program 4. After a four-week interval, the same test item was included in the pretest before the eighth, or review, session. The topic of Tactical Air Control Parties was explicitly treated in the review program, this time by drama combined with narration. At the close of the review program, the same test item was repeated for the fourth time.

Records were available from stratified samples for 435 officers and 256 enlisted men who had taken all four of the tests in which the Tactical Air Control item appeared, and had viewed both Program 4 and Program 8. Table 10 and Figure 8

* (A) is the correct alternative

TABLE 10

PERCENTAGES OF CORRECT RESPONSES GIVEN TO TEST ITEM 25P4 BEFORE INSTRUCTION, AFTER INSTRUCTION, AND BEFORE AND AFTER A REVIEW SESSION PRESENTED FOUR WEEKS AFTER ORIGINAL INSTRUCTION

	N	Before Instruction	Immediately After Instruction	Four Weeks after Instruction: Before Review Session	Four Weeks after Instruction: After Review Session
Officers	435	32.2	95.4	95.4	97.5
Enlisted Men	256	21.9	84.4	85.9	89.5

show (a) that officers and enlisted men benefited greatly from the original instruction, (b) that there was no forgetting over a four-week interval (this was not typical), and (c) that the review further increased the high percentage of correct answers.

The total program time devoted to the treatment of Tactical Air Force Parties was two minutes and 55 seconds, of which 47 seconds (Scene 74) of narration dealt

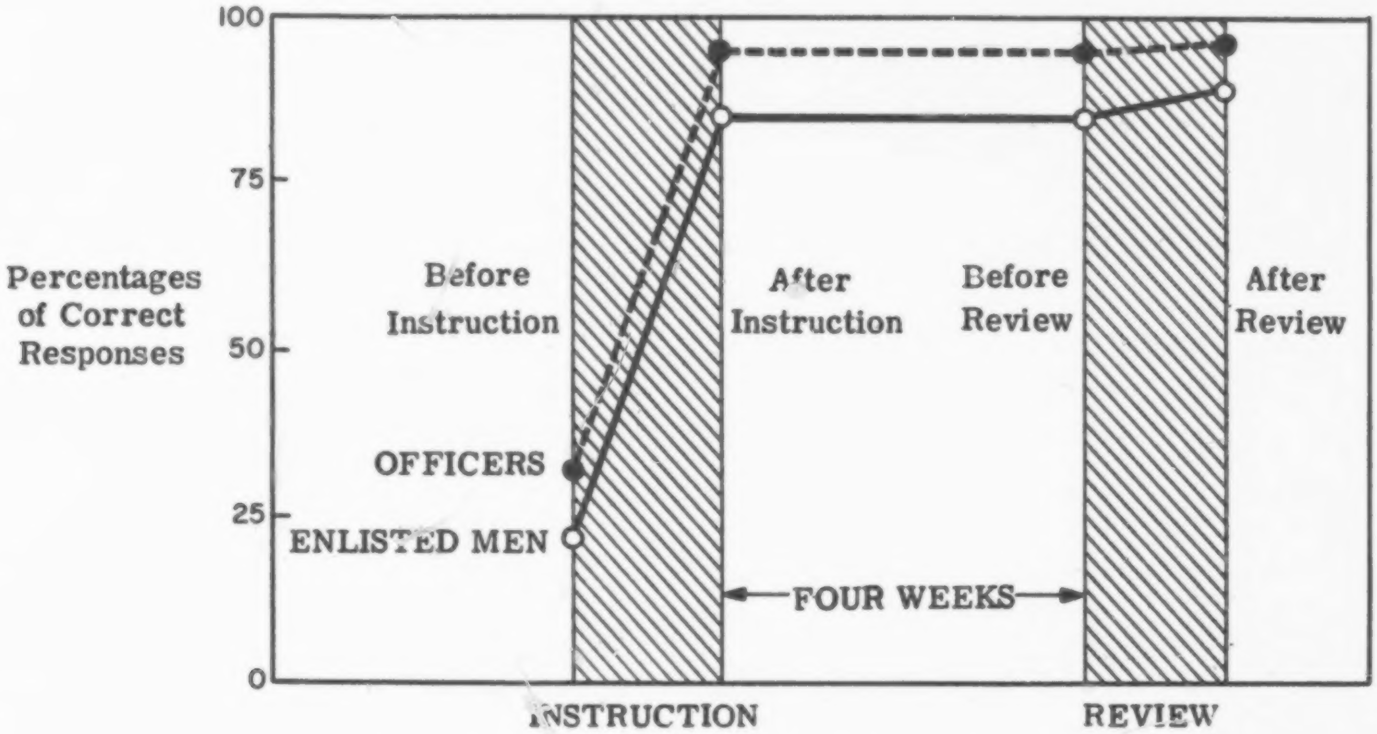


Figure 8. The Effect of Explicit Instruction upon Frequency of Correct Responses to Test Item 25P4

specifically with the question asked in Item 25P4. The following excerpt from the television script shows the complete treatment given to the topic of Tactical Air Control Parties:

SCENE 68: EXTERIOR - G-3 HEADQUARTERS

MEDIUM SHOT ON THE OPEN DOOR OF THE G-3 OFFICE, THROUGH WHICH WE SEE THE TANK COLONEL LEAVING THE G-3. HE COMES OUT OF THE DOOR JUST AS MAJOR BARNEY MILLER, G-3 FOR AIR, PASSES HIM, WAVES HELLO, AND ENTERS THE G-3 OFFICE.

NARRATOR II:
Back at the G-3 office there's a new visitor arriving, Major Miller, G-3 Air. He's the officer upon whom Colonel Baker will depend for working out the details of tactical air support.

SCENE 69: INTERIOR - G-3 HEADQUARTERS

MEDIUM SHOT ON MAJOR MILLER AS HE ENTERS G-3 OFFICE AND WALKS TO G-3 TO DESK, THE CAMERA PANNING HIM.

CLOSE SHOT ON THE ASSISTANT G-3 ENTERING NOTES ON OPERATIONS ORDER.

COLONEL BAKER'S VOICE:
Sit down, Barney - where have you been?

MAJOR MILLER'S VOICE:
I was getting our tactical air control party oriented on the situation.

MEDIUM SHOT ON THE G-3 AND MAJOR MILLER

COLONEL BAKER:
We still haven't made up our requirements for air strikes, you know. I wanted to get started before this, to be sure the Tactical Air Force has our requests from Army.

MAJOR MILLER:
I'm ready.

AS THE G-3 GOES TO MAP, MAJOR MILLER TURNS IN HIS CHAIR TO LOOK AND OCCASIONALLY SCRIBBLES NOTES AT DESK.

COLONEL BAKER:
Now! There are two enemy batteries here (POINTING) which our artillery can handle. But these heavy tank concentrations (HE POINTS) further up here will need air attacks.

SEE MAP #6 FOR ABOVE.

EXTREME CLOSE-UP ON MAP AS G-3's HAND POINTS OUT G-3's SHADOWED PROFILE IN LOWER LEFT HAND CORNER.

COLONEL BAKER'S VOICE:
Take a look at this hill, here.

SEE MAP #6

HAND POINTS BENCH MARK 595 (HILL). JUST NORTH OF MARYSVILLE.

According to G-2, it's covered with trees and honey-combed with caves, and aggressor troops have been observed there.

MEDIUM SHOT ON THE G-3 AND MAJOR MILLER FROM ANOTHER ANGLE.

COLONEL BAKER: (CONTINUING)
Well -- if the aggressor retains a sizeable force there, it'll become a danger area to our troops coming in from here. (HE POINTS)

MAJOR MILLER:
I see -- well, I'll request pre-planned missions for those two areas. Tactical Air Force will probably select fighters armed with rockets to attack that tank concentration.

COLONEL BAKER:
The hill looks more like an area target, and the aggressor troops there will probably hide out in those caves.

MAJOR MILLER:
That'll mean a job for the tactical bombers.

COLONEL BAKER:
Now, when you request the pre-planned missions, tell them we'll probably need "immediate support" missions in the area southeast of Junction City where the aggressor may bring in some reinforcements.

(FADED OUT)

SCENE 69: TERRAIN MODEL

MEDIUM SHOT ON NARRATOR II.

NARRATOR II:
An "immediate support" or "on call" mission is used when it is reasonably sure that an air attack will be needed, but when the time and the target are uncertain.

DISSOLVE:

SCENE 70: FILM

SHOT OF PLANE ZOOMING AT LOW ALTITUDE AND HIGH SPEED

SCENE 71: SHOT OF PILOT

SCENE 72: AIR SHOT OF GROUND MOVING SWIFTLY BELOW

SCENE 73: TACP OFFICER ON RADIO. (THIS CAN BE FAKED BY A SHOT OF ANYONE ON RADIO)

SCENE 74: SHOT OF PILOT TALKING ON RADIO

NARRATOR II: (CONTINUING)
When a pilot flies an aircraft at high speed and at low altitudes, he may have trouble identifying ground targets. To avoid mistakes, he is told the location of our own ground troops, and is guided to targets by Tactical Air Control Parties. In this situation, one such party is with each infantry regiment and one is with the division headquarters.
These parties are composed of Air Force Personnel. By being with the front line troops, and by talking with the pilot by radio, they can guide him to the proper target, referring to easily identifiable landmarks.

DISSOLVE:

SCENE 75: INTERIOR G-3 HEADQUARTERS

MEDIUM SHOT ON THE G-3 AND MAJOR MILLER AT THE DESK.

MAJOR MILLER:
I'm sure we can count on the tactical air control parties.

COLONEL BAKER:
Then that does it.

MAJOR MILLER GETS UP:
Get those requests in proper form and assign priorities to the targets before we forward them to Corps.

MAJOR MILLER:
Yes, sir!

In contrast to the direct, explicit treatment accorded the subject of Tactical Air Control Parties, may be cited the treatment given the topic of "Priority of Fires." The sequence of scenes in which this topic was covered consumed two minutes and 55 seconds, the same running time as for the Tactical Air Control Parties topic. The subject of "Priority of Fires" was treated in a dramatic sequence consisting principally of dialogue between two officers, the Commander of the 60th Infantry Regiment, and the Commanding Officer of the 79th Field Artillery Battalion. The test item which related to this topic was Item 12P4:*

> "The priority of fires to be provided by direct support for the battalions of an attacking Infantry Regiment is decided by the
>
> (A) Commanding Officer of the supporting Field Artillery Battalion
> (B) Commanding Officer of the Infantry Regiment
> (C) Commanding Officers of the Infantry Battalions
> (D) G-3 of the Division Artillery."

---

* (B) is the correct alternative

The following excerpt from the television script presents the entire treatment given to arranging Priority of Fires. It is to be noted that the introduction of the two officers by the narrator at the opening of Scene 32 does not explicitly identify either of the two officers as the Regimental Commander or as the Commanding Officer of the 79th Field Battalion. Because it is necessary for an observer to infer from the dialogue the role played by each of the officers, and because the discussion is quite diffuse, the treatment given to the topic of Priority of Fires was rated as "sketchy."

SCENE 32: INTERIOR - 60th INFANTRY CP:

MEDIUM SHOT ON COLONEL JAKE WATSON AND LT. COL. KEN CARSON, AS THEY STAND OVER AN OVERLAY MAP #5 RESTING ON A TABLE.

NARRATOR II:
Later, the commanding general did approve the plan for the 20-minute preparation. It is now being worked out in more detail in the lower echelons of the division.

THE CAMERA STARTS TO MOVE IN VERY SLOWLY TO THE TWO AT THE TABLE.

Here, in the 60th Infantry CP, the Regimental Commander, Colonel Watson, is discussing attack plans with Colonel Carson, Commanding Officer of the 79th FA Battalion.

COLONEL CARSON:
I just heard from Division Artillery a few minutes ago. They tell me I'm in direct support of your regiment.

COLONEL WATSON:
That's right. Let's get started. Have a seat.

CARSON SEATS HIMSELF.

I'll show you my tentative plan on this map.

COLONEL CARSON:
O.K.

THE CAMERA SHOULD NOW BE ON AN EXTREME CLOSE-UP OF THE MAP.

EXTREME CLOSE-UP ON THE MAP (INSERT CAMERA)
(ALL POINTS ARE MARKED OUT IN OVERLAY 5 TO GO WITH MAP 5) THE PROFILED SHADOWS OF BOTH MEN ARE SEEN IN THE BOTTOM CORNERS OF THE MAP.

COLONEL WATSON'S VOICE: (CONTINUING)
I plan to attack with battalions abreast. The 1st on the right and the 3rd in reserve. I'm also holding the 20th Tank Battalion in regimental reserve. The regimental tank company will be attached to the 1st battalion, except for one tank platoon, which will be attached to the 2nd battalion.

COLONEL CARSON'S VOICE:
This is the boundary between your battalions here.

INDICATED IN OVERLAY 5

COLONEL WATSON'S VOICE:
Right! Now, the 1st battalion gets priority of fires. It's initial objective is here. And, from here, the battalion will go on to Division Objective #1, right here.

INDICATED IN OVERLAY 5

MEDIUM SHOT ON COLONEL CARSON AND LT. COL. WATSON FROM ANOTHER ANGLE

COLONEL CARSON:
You say priority of fires to the 1st Battalion. Does that apply to both the scheduled fires for the preparation and the "on call" fires, after the attack jumps off?

COLONEL WATSON:
Uh-huh! (NODDING HIS HEAD) I want them to have all the fire power they need so that the 1st Battalion can push through in a hurry, once they jump off.

CLOSE-UP ON LT. COL. CARSON.

COLONEL CARSON:
Any specific targets you want to include in the preparation?

CLOSE-UP ON COLONEL WATSON.

COLONEL WATSON:
Just a few. First, we've definitely located two aggressor OP's.

EXTREME CLOSE-UP ON MAP. (INSERT CAMERA) AS HAND POINTS OUT DETAILS.

COLONEL WATSON'S VOICE:
One here (POINTING FAR OUT ON MAP) and one here (POINTING CLOSE IN ON MAP). At H-5, I want you to start smoking this OP (POINTING TO THE ONE FAR OUT) and continue to smoke it until we tell you to lift your fires.

MEDIUM SHOT ON COLONEL WATSON AND LT. COL. CARSON AT MAP.

COLONEL CARSON:
Check! How about the other OP? Want us to take care of it, too?

INDICATED IN OVERLAY 5

COLONEL WATSON:
Nope! I'll handle it with my heavy mortar company.

COLONEL CARSON:
Anything else?

COLONEL WATSON:
Yes, I've been up talking to the 201st, and there are two targets out there that are giving them a bad time.

COLONEL CARSON:
What are they?

COLONEL WATSON:
An anti-tank gun and some automatic weapons.

EXTREME CLOSE-UP ON MAP (INSERT CAMERA) AS HANDS POINT OUT PLACES.

COLONEL WATSON'S VOICE: (CONTINUING)
The anti-tank gun is located here (PLACING CIRCLE ON MAP) and the automatic weapons are here (PLACING ANOTHER CIRCLE ON MAP).

INDICATED IN OVERLAY 5.

MEDIUM SHOT ON COLONEL WATSON AND LT. COL. CARSON.

COLONEL CARSON:
Good!

COLONEL WATSON:
One more thing: during the last two minutes of the preparation, I want you to place all the fire you can .... along this line, in front of my right Battalion.

EXTREME CLOSE-UP ON MAP (INSERT CAMERA) AS HIS HAND DESCRIBES THE LINE, WITH GREASE PENCIL, ABOUT 1000 YARDS LONG. SHOULD RUN PARALLEL TO THE L.D. AND SHOULD BE ABOUT 300 YARDS IN FRONT OF L.D. (SEE OVERLAY 5)

COLONEL WATSON:
I want those men to know that the ground in front of them has been so well covered that they'll have comparatively easy going for the first few hundred yards, and that plenty of artillery fire will be available to them whenever they need it.

CLOSE SHOT ON COLONEL CARSON.

COLONEL CARSON:
Good idea! Initially, I can put two battalions on that mission. Probably be able to get general support artillery through Division Artillery, if we need it.

MEDIUM SHOT ON COLONEL WATSON AND COLONEL CARSON.

COLONEL WATSON:
Fine! That's about everything I can give you now.

SCENE 33: TERRAIN MODEL

MEDIUM SHOT ON NARRATOR II.

NARRATOR II:

Colonel Carson will be coordinated with infantry through his artillery liaison officers, at the Infantry Battalion CP's.

DISSOLVE:

Test item 12P4 reproduced above was presented before the program in which priority of fires was treated, immediately after that program, and again one week later. Records were available on stratified samples for 438 officers and 299 enlisted men who had taken all three of the tests in which this item appeared, and who had viewed the program in which the subject of priority of fires was treated. Table 11 and Figure 9 report the percentages of correct responses given by officers and enlisted men on each of the three occasions when the item was presented. For the officers, there was a decrease of 7 per cent in the percentage of correct responses as a result of "instruction," and a week later, there was a further decline of 4 per cent in percentage of correct responses. The enlisted men showed a negligible increase of 2 per cent as a result of instruction, and changed only slightly one week later.

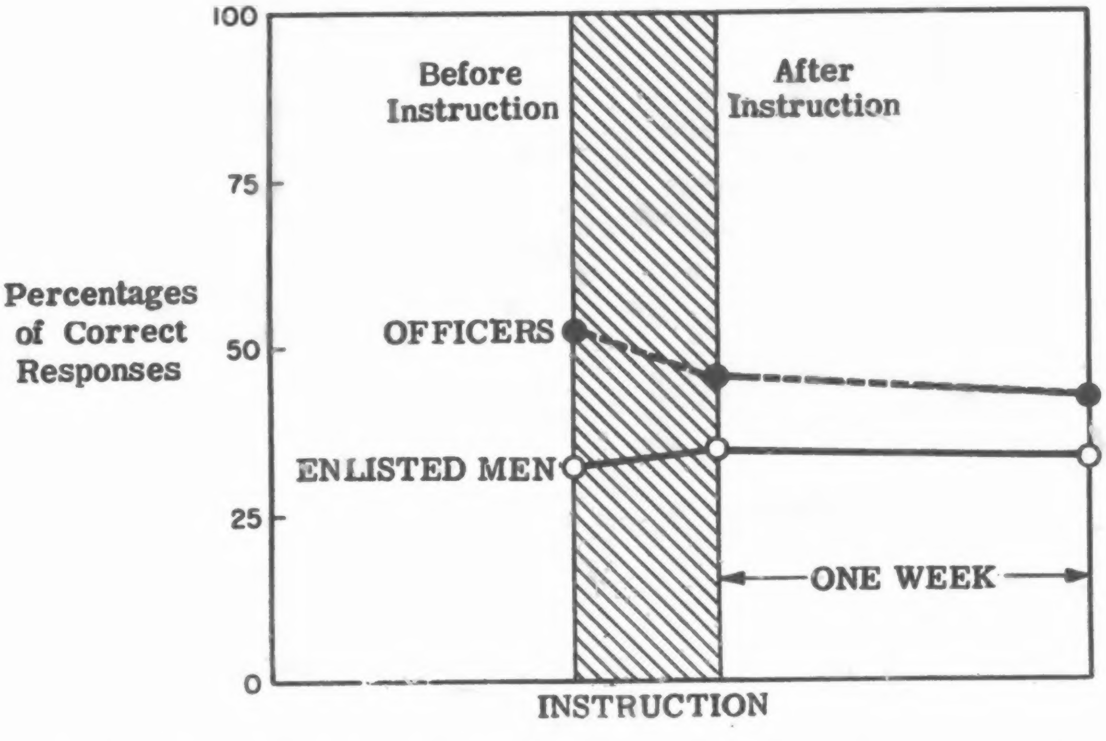


Figure 9. The Adverse Effect of Sketchy Instruction upon Frequency of Correct Responses to Test Item 12P4

TABLE 11

PERCENTAGES OF CORRECT RESPONSES GIVEN TO TEST ITEM 12P4 BEFORE INSTRUCTION, AFTER INSTRUCTION, AND ONE WEEK LATER

	N	Before Instruction	Immediately After Instruction	One Week After Instruction
Officers	438	52.3	45.0	40.9
Enlisted Men	299	30.8	32.8	32.4

Data from this and other topics given sketchy treatments make it clear that a vague or sketchy treatment of a topic may not only fail to put across the point intended, but it may actually confuse some of the observers and cause them to acquire erroneous information. For example, before instruction, 229 officers - 52.3 per cent of the sample - gave the correct response to item 12P4. Immediately after the program in which that topic was treated, 103 of the officers who had previously given the correct response chose one of the incorrect alternatives. Of the 209 officers who gave an incorrect response before instruction, only 71 gave the correct response after instruction. Results of testing other ineffectively taught topics showed interference effects from different portions of the same program or even from other programs in the series.

CONCLUSIONS

In general, the results of this investigation indicate:

1. That television instruction is an effective means of training large numbers of reservists dispersed in widely separated groups. All grades of personnel made statistically significant gains on test scores for each of the programs.

2. That reservists not only learned from the television instruction, but they remembered most of what they had learned when re-tested four or six weeks later.

3. That television instruction continues to be highly acceptable to the reservists after eight weekly sessions. Over 70 per cent of the officers stated that they preferred television instruction to conventional classroom teaching, and indicated that the television programs had been more instructive than the average training films they had viewed within the past two years. About 60 per cent of the enlisted men expressed the same preferences.

4. That the amount of gain on test items is related to the explicitness of treatment of the topics on which these items are based. Items that are explicitly covered in the television sessions show large and significant gains. Some sketchily treated items show gains but many of them show losses in per cent of correct response after instruction indicating that trainees were confused rather than instructed by vague or diffuse treatment of topics.

5. That the type of instructional treatment given a topic influences the amount of learning. The various types of treatment recognized in the analysis are listed below in rank order of their effectiveness. Each of the first two types listed was more than twice as effective in producing learning as either of the last two types listed.

    a. Narration with meaning-conveying film
    b. Drama with some form of narration
    c. Narration
    d. Narration with "atmospheric" film
    e. Drama

RECOMMENDATIONS

RECOMMENDATIONS FOR USE

It has been demonstrated that television can convey instruction effectively to large and widely separated groups. It is recommended that demonstrational projects be undertaken immediately to provide service personnel with experience and with basic procedural patterns for utilizing television in troop training.

These demonstrational projects should be of four kinds:

a. Distribution of televised lessons originating on a military base to numerous classrooms on the same base.

Advantages: Security preserved
Relatively low cost
Minimum scheduling difficulties

b. Transmission by microwave of instructional sessions from commercial broadcasting studio to classes of troops on a single base.

Advantages: Uses existing studio facilities
Uses experienced television station personnel
Insures privacy but not absolute security

c. Distribution of television lessons to classes of trainees over limited networks of commercial telecasting stations.

Advantages: Reaches large numbers of trainees
Uses existing facilities
Insures well-prepared lessons

d. Use of mobile equipment for remote pick-up and for field exercises.

Advantages: Makes unnecessary the transportation of large numbers of personnel to remote points
Close-up views afforded all trainees
Permits pick-up from areas dangerous for personnel

RESEARCH SUGGESTIONS

The production facilities employed in the "Command Post" series were comparable to those utilized in top flight network entertainment programs. Experiments need to be undertaken to determine the training effectiveness of low-cost production procedures using military instructors rather than professional actors. Production cost per man is not of primary importance if ten or twenty thousand trainees view a single production. However, production cost per man is of great importance if only three hundred or five hundred trainees need to be reached by a given specialized television lesson.

Curricula of the service schools of the Armed Forces should be surveyed to determine in which training programs television can apparently be used economically and effectively. On the basis of experience with the four types of exploratory and demonstrational television training projects recommended above, criteria should be developed so that any course of training could be "rated" as to its adaptability to television. These criteria and rating procedures should then be validated experimentally.

The data of this study have suggested that direct narration is much more effective in producing learning than is dramatized action. However, other sources have indicated that the "straight lecture" type of instruction is relatively unsatisfactory. Inquiries need to be undertaken to determine the best balance between narration, demonstration, film and dramatized treatment.

Carefully designed and well controlled experimental studies can be conducted only in those situations in which the director of the experimental investigation is given authority regarding the television lessons equal to that of the producer of the television programs. Coordination at the top level between the research and production staffs is essential if "interest," "action," "expediency," "time limitations," etc. are to be prevented from interfering with sound experimental design. Some worthwhile studies can probably be conducted on a "permissive" or "catch-as-catch-can" basis in connection with television instructional sessions where effort is concentrated almost exclusively on production details. However, continued attention must be given such studies to insure that the results being obtained justify the expenditure of research funds being made.

RESERVATION OF CHANNELS

Television channels should be reserved for use by the Armed Forces so that they can initiate a program of military training by television. Some of these channels should be within the bands set aside for commercial telecasting. This would make possible the use of standard transmitting and receiving equipment. Other channels outside the commercial bands should be reserved for transmission of programs where privacy is desirable.

TECHNICAL REPORT SDC-20-TV-1

LEARNING FROM KINESCOPES AND FILMS

Human Engineering Division	Project Designation NR-781
Special Devices Center	P. O. 104401
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FOREWORD

Television as a mass communication medium has been accepted widely by the American people. Special Devices Center has tested the new medium for potential uses in military training. Out of these television tests has come a new kind of training film -- the kinescope. The kinescope, because it is made with television equipment, can be made more quickly and cheaply than standard training films.

The kinescope, however, has appeared to have some limitations for military training. For one thing the film quality of the kinescope seems somewhat inferior to the standard training film. For another the speed with which the kinescope is made precludes the professional slickness which characterizes many standard films. Are these things serious limitations and do they affect military training?

This study provides one answer to the problem of the effectiveness of the kinescope for training. The need for cheap, mass-produced training films indicates the importance of an evaluation of the kinescope for military training.

Robert Jackson

Robert Jackson
Applications Research Section
Human Engineering Division
Special Devices Center

LEARNING FROM KINESCOPES AND FILMS

SUMMARY

Introduction

The purpose of this study was to discover why kinescopes, in spite of some obvious limitations, were doing such a good job of military training. Previous experiment indicated that kinescopes were teaching as effectively or even better than regular classroom instruction. The learning results from kinescopes were surprising because experience with standard training films had led to the opinion that such films were about equivalent to regular classroom instruction or slightly inferior.

A question was raised whether kinescopes, associated as they are with the television industry, might account for the superior results. In other words, did kinescopes, simply because they were kinescopes, attract a special interest and readiness to participate in the learning situation?

From this general question two specific questions were asked in this study:

1. Would learning by kinescope be less if the kinescope were described as a standard training film?

2. Would learning by standard training film be better if the film were described as a kinescope?

Procedure

The experiment was designed to evaluate the learning of four pairs of matched groups:

1. First Pair:

   One group saw a kinescope which was described as a kinescope. The other group saw the same kinescope which was described to them as a standard training film.

2. Second Pair:

   One group saw a standard training film which was described to them as a kinescope.
   The other group saw the same standard training film which was described as a standard film.

3. Third Pair:

   One group saw the standard training film which was described to them as a kinescope.

The other group saw the same standard training film in color which was described as a standard film.

4. Fourth Pair:

   One group saw the standard training film which was described to them as a kinescope.

   The other group saw the same standard training film in color which was also described to them as a kinescope.

Results

1. First Pair:

The group which was told they were looking at a kinescope learned more than the group which was told they were looking at a standard training film when a kinescope was used in both instances.

2. Second Pair:

The group which was told they were looking at a kinescope learned more than the group which was told they were looking at a standard training film when a standard film was used in both instances.

3. Third Pair:

The group which was told they were looking at a kinescope learned more than the group which was told they were looking at a standard training film in color.

4. Fourth Pair:

The group which was told they were looking at a kinescope learned about the same as the group which was told they were looking at a kinescope in color.

Recommendations

Two recommendations are offered from these results:

1. Kinescopes in spite of their technical limitations should be considered very satisfactory for military training.

2. **Color, unless it is essential to the subject being taught, does not increase the effectiveness of television training sessions.**

LEARNING FROM KINESCOPES AND FILMS

INTRODUCTION

1. What Are Kinescopes?

Kinescopes are film recordings of television programs. Kinescopes are made by recording the image from a television tube on movie film. Experimental training kinescopes made at Special Devices Center, Office of Naval Research, are recorded on 16mm film. When projected on a screen, these kinescopes appear much like standard 16mm films.

2. What Is The Problem In Using Kinescopes?

Although kinescopes appear in general like standard films, they have some important limitations. For one thing, the film quality of kinescopes is somewhat inferior to standard films. Picture definition is inferior, details are fuzzier, and the striking clarity of well-made films is generally missing.

Persons who have experimented with kinescopes have been puzzled as to whether the inferior film quality would interfere with learning. Obviously, degradation in film quality could be carried to a point where training might be seriously impaired. An important problem has been whether the average kinescope is suitable for military training.

3. What Are The Previous Results?

When kinescopes were used in SDC experiments on mass training, good results were obtained.[1] Kinescopes were found to be almost equal to live television for military training. Kinescopes also proved superior to regular classroom instruction.

These are surprising results. Previous experiment with standard training films showed them to be about comparable to regular classroom instruction. Kinescopes seemed to be standing up as well, if not better, than standard training films for military instruction.

4. Why Are Kinescopes So Good In Military Training?

This study sought an explanation of the excellent test results that had been obtained in learning by kinescopes. Comparison of the kinescopes that had been used with standard training films showed that the kinescopes were unexceptional. They were inferior in film quality. Content of these kinescopes revealed nothing special. Format, learning organization, instructor techniques, etc., were not superior to training films.

---

[1] SDC Technical Report No. 476-02-2. Directed by Robert T. Rock.

At this point we suspected that kinescopes might be training so effectively simply because they were kinescopes. In other words, we guessed that the method of making kinescopes, associated as it was with the television industry, might account for the superior learning. Kinescopes must attract a special interest and readiness to participate in the learning situation, it was thought.

Thus two basic questions were asked in this study:

A. Would learning by kinescope be less if the kinescope were described as a standard training film?

B. Would learning by standard training film be better if the film were described as a kinescope?

EXPERIMENTAL DESIGN AND PROCEDURE

1. How Was The Experiment Designed?

The experiment was designed to evaluate the learning of four pairs of matched groups. (See Table I).

A. First Pair:

One group saw a kinescope which was described as a kinescope.

The other group saw the same kinescope which was described as a standard training film.

B. Second Pair:

One group saw a standard training film which was described as a kinescope.

The other group saw the same standard training film which was described as a standard film.

C. Third Pair:

One group saw the standard training film which was described as a kinescope.

Table 1

Design of Experiment, Showing 1. Intra-Pair Comparisons of Four Pairs of Matched Groups, 2. What They Saw, 3. Description of What They Saw

Four Pairs of Matched Groups	What They Saw	Description of What They Saw
A. First Pair		
Group One	Kinescope	They were told it was a Kinescope
Group Two	Kinescope	They were told it was a Training Film
B. Second Pair		
Group One	Training Film	They were told it was a Kinescope
Group Two	Training Film	They were told it was a Training Film
C. Third Pair		
Group One	Training Film	They were told it was a Kinescope
Group Two	Training Film in Color	They were told it was a Training Film
D. Fourth Pair		
Group One	Training Film	They were told it was a Kinescope
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The other group saw the same standard training film in color which was described as a standard film.

D. Fourth Pair:

One group saw the standard training film which was described as a kinescope.

The other group saw the same standard training film in color which was also described as a kinescope.

2. Who Were The Subjects?

The subjects were 240 Airmen stationed at Mitchell Air Force Base, Garden City, New York. The Airmen were divided into four pairs of matched groups, each group containing thirty men.

The Airmen were matched as closely as possible on the following factors:

A. Age
B. Rank
C. Classification scores (intelligence and aptitude)
D. Years of schooling

The other group saw the same standard training film in color which was described as a standard film.

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The Airmen were matched as closely as possible on the following factors:

A. Age
B. Rank
C. Classification scores (intelligence and aptitude)
D. Years of schooling

3. How Was Learning Estimated?

Learning was estimated by administering a 100 item true-false test. Two tests were constructed. One was based on the content of the kinescope. The other was based on the content of the standard training film.

Both questionnaires were pre-tested and standardized by analyzing the results of the pre-tests. The pre-tests were conducted among undergraduate college students in the New York Metropolitan area.

4. How Were The Kinescope And Film Selected?

The results of this experiment are based on intra-media comparisons, that is the kinescope against itself and the standard training film against itself. Both a kinescope and a film were used in the experiment simply to validate the results. It was felt that the validation would be better if the kinescope and film were fairly similar.

For this reason three criteria were applied in the selections:

A. The content of both should be similar.

B. The viewing time of both should be the same.

C. Both should be capable of being plausibly described either as a kinescope or a standard training film.

The kinescope selected was "Radiological Defense". This is an experimental training kinescope made by Special Devices Center to train military personnel in atomic defense. The film was "Patterns for Survival". This is a commercial educational film made to train civilians in atomic defense.

Both met the three selection criteria indicated above.

5. How Was The Experiment Conducted?

The following procedure was followed with all of the experimental groups:

A. An explanation of the true-false test was read.

B. The true-false test was given.

C. A description of the presentation as a kinescope or a standard training film was read (See Design, Table 1).

D. The kinescope or training film was shown.

E. The original true-false test (step B) was given again.

The important variable in the experiment is what the groups were told they were looking at (a kinescope or a standard training film). In order to keep a group from being unduly impressed, we attempted to make our description of the kinescope as matter-of-fact as possible. In other words, we tried not to overdescribe the kinescope in contrast to the standard training film.

The groups which were told they were looking at a kinescope heard the following description:

"You are about to see a kinescope. A kinescope is a television program that is filmed through a television camera. The television program which you will see was broadcast from the Special Devices Center to train people in atomic defense. We are trying to find out how well this television program trains."

The groups which were told they were looking at a standard training film were read a similarly brief and matter-of-fact description of the film.

No time limit was imposed on the true-false test. Average group time for the test was about twenty minutes. If a subject had trouble with the mechanics of the test, he was given unobtrusive assistance. No other assistance was given. Each group took about 1 hour and 20 minutes to complete the experiment.

Two test scores were obtained for each subject, the "before" score and the "after" score. These scores were corrected for chance by subtracting the number of wrong answers from the number of rights. Final scores were determined by subtracting the corrected "before" scores from the corrected "after" scores. All data in this report are based on these corrected gain scores.

RESULTS

1. Were The Groups Well Matched?

Scores on the "before" tests were examined to determine whether the paired groups had been successfully matched. The following results indicated that the paired groups had been evenly matched:

A. Mean group scores on the "before" tests did not differ significantly within the paired groups. Prior information about atomic defense was almost the same in the paired groups.

B. Variance scores on the "before" tests did not differ significantly within the paired groups. Distribution of scores within the paired groups was thus about the same before seeing one of the films.

2. Did Learning Differ Between The Paired Groups?

All of the experimental groups learned from the kinescope or training film as indicated by improved "after" scores. Where expected, the amount learned differed significantly within the paired groups.

By examining the gain scores of the paired groups, the following was found:

A. First Pair: (Saw Kinescope)

The group which was told they were looking at a kinescope learned more than the group which was told they were looking at a standard training film.

This difference was significant at the 1 percent confidence level. (See **Figure** 2).

B. Second Pair: (Saw Training Film)

The group which was told they were looking at a kinescope learned more than the group which was told they were looking at a standard training film.

This difference was significant at better than a 1 percent confidence level. (See **Figure** 3).

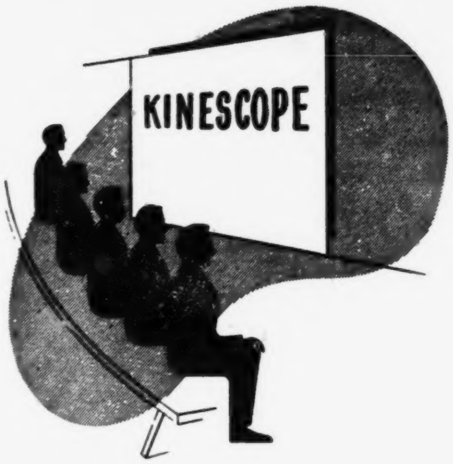
C. Third Pair: (Saw Training Film)

The group which was told they were looking at a kinescope learned more than the group which was told they were looking at a standard training film in color.

FIGURE 2

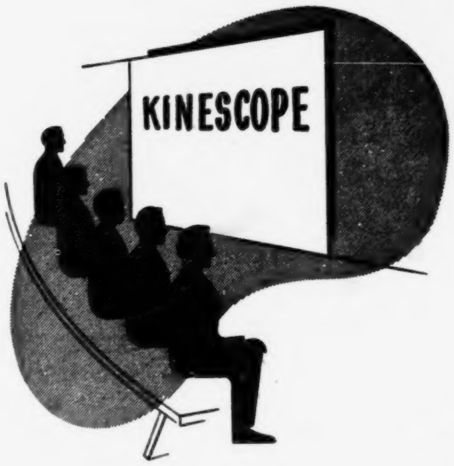
Results of First Pair of Matched Groups Viewing the Same Kinescope under Two Conditions

Group One Was Told They Were Looking at a Kinescope



Result: Learning Score = 36

Group Two Was Told They Were Looking at a Training Film



Result: Learning Score = 28

Superior Learning of Group One Is Significant.

(It Could Have Occurred by Chance about One Time in a Hundred.)

FIGURE 3

Results of Second Pair of Matched Groups Viewing the Same Training Film under Two Conditions

Group One Was Told They Were Looking at a Kinescope

TRAINING
FILM

Result: Learning Score = 40

Group Two Was Told They Were Looking at a Training Film

TRAINING
FILM

Result: Learning Score = 26

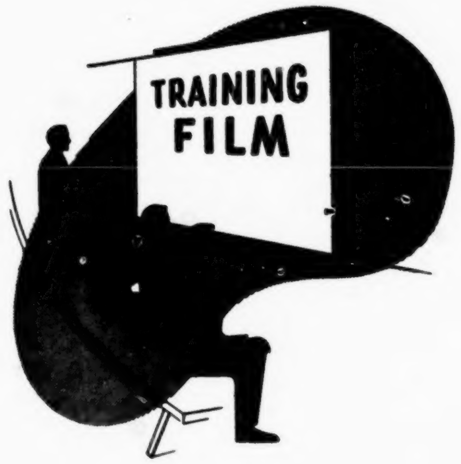
Superior Learning of Group One Is Significant.

(It Could Have Occurred by Chance Less Than One Time in a Hundred.)

FIGURE 4

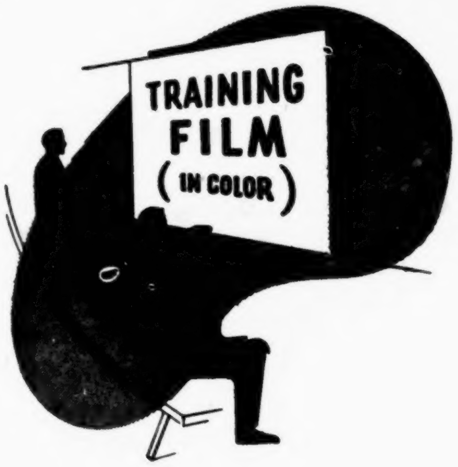
Results of Third Pair of Matched Groups Viewing the Same Training Film (One Version in Color) under Two Conditions

Group One Was Told They Were Looking at a Kinescope



Result: Learning Score = 40

Group Two Was Told They Were Looking at a Training Film



Result: Learning Score = 25

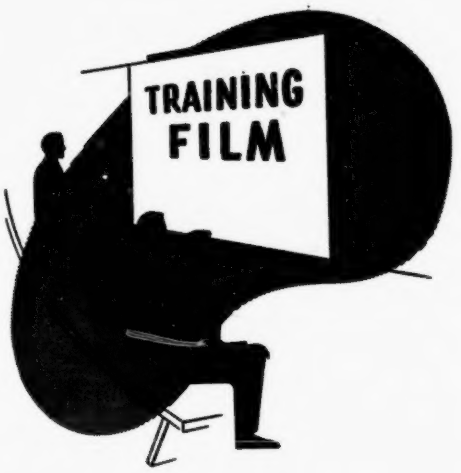
Superior Learning of Group One Is Significant.

(It Could Have Occurred by Chance About One Time in a Hundred.)

FIGURE 5

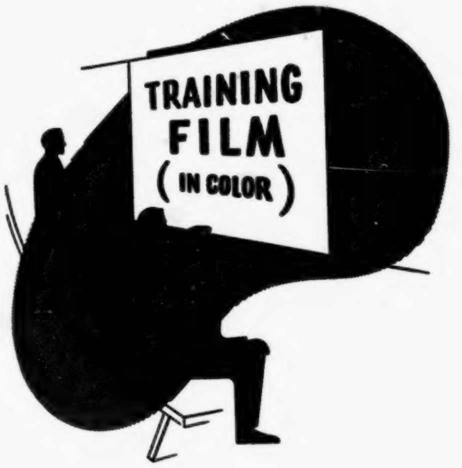
Results of Fourth Pair of Matched Groups Viewing the Same Training Film (One Version in Color) under the Same Conditions

Group One Was Told They Were Looking at a Kinescope



Result: Learning Score = 40

Group Two Was Told They Were Looking at a Kinescope



Result: Learning Score = 34

Learning of the Two Groups Does Not Differ Significantly.

(It Could Have Occurred by Chance about Thirty Times in a Hundred.)

This difference was significant at the 1 percent confidence level. (See Figure 4).

D. Fourth Pair: (Saw Training Film) The group which was told they were looking at a kinescope learned about the same as the group which was told they were looking at a kinescope in color. The slight difference which occurred in favor of the first group was considered insignificant. (See Figure 5).

3. What Are The Conclusions?

The two most important conclusions from this study are:

A. When a kinescope or a standard training film is described as a kinescope, learning increases significantly.

B. The superior learning resulting from describing the film as a kinescope occurs whether or not the presentation is in color.

4. What Are The Inferences?

No interpretation should be drawn from these results that standard training films should be called kinescopes to improve learning. The deception practiced in this study was done simply for scientific validation. An accurate statement of the facts was given to the subjects when the experiment was completed.

The conclusion that color in a training film has no effect on learning is limited by the conditions of the experiment. It is important to note that in the film used, color was not relevant to the subject which was taught.

It is not easy to account for the results of this experiment. Three possible explanations are offered:

A. Novelty effect
B. Immediacy
C. Culture

The novelty of kinescopes may quicken the interest of trainees and create a greater readiness to learn. Novelty of kinescopes, associated with novelty of television, may thus explain differences in learning obtained in this study. It should be noted that the subjects were from the Metropolitan

New York area and familiar with television. This may not mean that they were similarly familiar with kinescopes.

The impression of immediacy associated with television may be carried over to kinescopes. This is to suggest that an impression of recency or immediacy will increase trainees' readiness to learn. This effect can be compared to the impression which the word "Extra" makes on the daily edition of the newspaper.

A third explanation suggests that these results are due to a cultural characteristic of Americans. This cultural characteristic has been described by Margaret Mead[1] and others as a desire to change in certain approved directions. This pattern of change is considered institutionalized and a predictable factor in American culture. Technological progress represented by television and by kinescopes would, in this thinking, be an acceptable direction of change. Because they represent progress, kinescopes are thus a more effective medium for teaching.

5. What Are The Recommendations?

A. Kinescopes in spite of their

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[1] Mead, Margaret. And Keep Your Powder Dry.

technological limitations should be considered very satisfactory for military training.

B. Color, unless it is essential to the subject being taught, does not increase the effectiveness of television training sessions.

TECHNICAL REPORT - SPECDEVCEN 269-7-42

RELATIVE EFFECTIVENESS OF VERBAL INTRODUCTIONS TO KINESCOPE RECORDINGS AND TRAINING FILMS

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SPECDEVCEN Project 20-E-4
Contract N6onr-269

- -

6 May 1955

For the Special Devices Center

CHSMurphy
C. H. S. Murphy, Captain, USN
Commanding Officer and Director

Instructional Film Research
Distribution List

SPECIAL DEVICES CENTER
OFFICE OF NAVAL RESEARCH
HUMAN ENGINEERING DEPARTMENT

Problem

Certain instructions given prior to a film showing have been shown to increase learning (20-TV-1 and 269-7-24). The 20-TV-1 study showed that if two groups were shown the same film, the group told it was looking at a kinescope learned significantly more than the group told it was looking at a film. This study was done to check this finding now that television and kinescope recordings are no longer a novelty.

Results

This study found that trainees learned about the same amount from a film whether they were told it was a kinescope or a film. Apparently the novelty of kinescopes no longer stimulates trainees to greater learning.

Recommendation

No advantage in learning can be expected by calling a film a television recording. This change in the facts as compared with the earlier report is thought to be associated with the idea that television is no longer a novel situation. These two reports point up the marked but apparently temporary value of novelty in the learning situation--an aspect of learning which is little understood.

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RELATIVE EFFECTIVENESS OF VERBAL INTRODUCTIONS TO KINESCOPE RECORDINGS AND TRAINING FILMS

by

Paul M. Hurst, Jr.[1]

The Instructional Film Research Program
The Pennsylvania State University

INTRODUCTION

The purposes of this study were (a) to ascertain whether trainees will learn more or less from a training film if they are told that it is a "kinescope recording of a television program," rather than a regular "training film," and (b) to see if trainees will learn more or less from a kinescope recording if it is introduced to them as being a "training film" rather than a "kinescope recording."

This research was an extension of a study conducted by Robert Jackson of the Special Devices Center.[2] In his experiment a training film (Pattern for Survival) was shown to groups of trainees under two conditions: (1) to the first group the film was described as a kinescope recording of a television program, (2) to the second group the film was introduced as a regular training film. Similarly a kinescope recording of a television program (Radiological Defense) was shown to two groups of trainees: Jackson told one group that this kinescope recording was in fact a kinescope; the other group was told that it was a regular training film (see Appendix I for Jackson's instructions to trainees). A further section of Jackson's experiment dealt with color as an experimental variable, but the results were non-significant and do not concern us here. The results of the main part of the study however, were highly significant.

Jackson found that the group seeing the training film (Pattern for Survival) introduced as a "kinescope" obtained a learning gain of 40, whereas the group seeing this same film introduced as a "training film" earned a mean gain of 26. The group seeing the kinescope (Radiological Defense) described as a "kinescope" obtained a mean learning gain of 36, whereas the group seeing this same kinescope described as a "training film" obtained a mean gain of only 28. Both differences favor the situation where the material presented was described as a "kinescope recording of a TV program" at the 1% level of confidence.

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[1] This report is based on a thesis submitted in partial fulfillment of requirements for the degree of Master of Science at The Pennsylvania State University.

[2] Jackson, Robert. "Learning from Kinescopes and Films." Technical Report SDC 20 TV 1.

These differences were so striking that it was considered advisable, in the present experiment, to repeat the above study using the same kinescope and film with different subjects of a somewhat comparable educational level, and to attempt to generalize Jackson's findings by testing learning from two additional kinescope recordings and two additional training films.

EXPERIMENTAL PROCEDURE

Subjects

The subjects taking part in the present experiment were recruits at the Bainbridge Naval Training Center. A total of 931 men took part in the experiment. Each film-kinescope comparison pair of groups was initially matched on the basis of number of weeks of training and mean Navy General Classification Test scores.

Films and Kinescope Recordings Used

The several groups of subjects saw the following kinescope recordings or training films:

Kinescope Recordings	Training Films
A. Radiological Defense	D. Pattern for Survival
B. Manila and Wire Rope	E. An Introduction to Measuring Instruments
C. Survival at Sea	F. Castaway, Part I

Reasons for Selection of These Kinescopes and Films

A and D were the kinescope and film used by Jackson.

Failure to generalize Jackson's finding to other training films and kinescope recordings (assuming they were confirmed for Radiological Defense and Pattern for Survival) could be due to several causes among which are the susceptibility of training films to representation as kinescope recordings and vice versa. Also, differences in the motivational influence of particular films or kinescopes could interact to a varying degree with differences in "set" induced by describing the material presented as "a kinescope recording" or as "a training film."

Therefore, it seemed desirable to select films or kinescopes which differed widely in a number of characteristics: (1) interest value (2) dramatic qualities (3) idea burden and (4) susceptibility to representation as a training film or kinescope recording.

It is considered that the above films and kinescope recordings show an adequate dispersion of these qualities. For example, trainees might readily accept the film an Introduction to Measuring Instruments as a kinescope recording of a TV program as it was filmed in a studio and consisted mainly of close-up views of measuring tools. On the other hand, it was considered that the film Castaway might not be so readily accepted as a kinescope recording of a television program as it consisted chiefly of scenes of an aviator at sea in a small life raft. Similarly, the kinescope Survival at Sea might be quite readily accepted as a training film because it contained a number of televised film sequences, whereas Manila and Wire Rope might be less well accepted by the trainees as a regular instructional film, as its treatment followed more along the line that might be expected in a television presentation of this subject. Castaway was an interesting story-type dramatic film while An Introduction to Measuring Instruments was an expository film with a rather high idea burden. Radiological Defense and Pattern for Survival dealt with atomic defense, a subject matter which was assumed to be of general interest.

Since each comparison was based on each film (or kinescope) described as (1) a "kinescope," and (2) as a "training film," it was considered unnecessary for the subject matter of the films selected to parallel that of the kinescopes. However, A-D and C-F are somewhat parallel in subject matter, while B-E are not.

Tests

The tests used in the experiment were of two types.

(1) True-false tests. These were Jackson's original tests (of 100 items each) given to the groups that saw Radiological Defense and Pattern for Survival.

(2) Multiple-choice tests. Multiple choice tests, each comprising between 50 and 60 items, were constructed by the Instructional Film Research Program staff members to cover the content of the other films and kinescope recordings. (Table 1 shows the reliabilities of these tests.)

In addition, Navy GCT and Mechanical Aptitude test scores were available for every trainee.

TABLE 1

ESTIMATED RELIABILITY OF TESTS

Test on:	No. of items	Type	Reliability[1]
Radiological Defense	100	True-false	.69
Manila and Wire Rope	55	4-choice	.86
Survival at Sea	54	4-choice	.84
Pattern for Survival	100	True-false	.70
Measuring Instruments	60	4-choice	.99
Castaway	61	4-choice	.79

[1] These reliability coefficients were computed using the Kuder-Richardson Formula 21.

Procedure

Main Experiment. Twelve groups of trainees--six pairs of groups matched as closely as possible--were used in the main experiment. Table 2 shows the experimental groups and treatments.

TABLE 2

EXPERIMENTAL GROUPS AND TREATMENTS (MAIN EXPERIMENT)

Group	N	Film or Kinescope Presented	Material Introduced As:	GCT	MA
1	56	Radiological Defense	Kinescope	51.70	48.89
2	65	(Kinescope)	Training Film	50.60	49.89
3	40	Manila & Wire Rope	Kinescope	51.35	50.35
4	36	(Kinescope)	Training Film	50.30	46.08
5	46	Survival at Sea	Kinescope	49.43	48.15
6	43	(Kinescope)	Training Film	49.88	48.16
7	64	Pattern for Survival	Kinescope	49.12	47.12
8	66	(Film)	Training Film	48.57	47.81
9	72	Introduction to Measuring Instruments	Kinescope	51.87	51.62
10	67	(Film)	Training Film	50.45	50.07
11	65	Castaway	Kinescope	53.88	51.15
12	58	(Film)	Training Film	51.34	50.15

Each group first heard the instructions and was then pre-tested on the material to be presented. Each group next saw either a kinescope recording or training film, and was then post-tested using the same test.

The introductory remarks were similar to those used by Jackson. (See Appendices I and II). All subjects were told in advance that they would be post-tested on the test they were about to take as a pre-test. Time of day for testing was staggered to avoid systematic bias to either method of presentation throughout the series of comparisons made.

Scores on the pre-tests and post-tests were obtained. In addition GCT and MA test scores were available for each trainee. Analysis of covariance was employed to determine the significance of differences between the two conditions of presentation for each of the six pairs of groups. The covariance was used to correct for small differences between groups in GCT and MA scores, and scores on the pre-test on the subject matter. Scores on the post-test were used as the criterion of learning. It was assumed that the groups were homogeneous, and no tests for homogeneity of variances and regression were made.

Replication. Anomalous results obtained for the film, *An Introduction to Measuring Instruments* (see *Results* below) prompted a replication of the experiment with this film. During this replication an electrical power failure caused the "loss" of the "training film" group. Consequently, another replication was performed, this time embodying both *An Introduction to Measuring Instruments* and *Radiological Defense*. Characteristics of the groups used in the replication are given in Table 3.

TABLE 3

EXPERIMENTAL GROUPS AND TREATMENTS
(REPLICATION)

Group	N	Film or Kinescope Presented	Material Introduced As:	GCT	MA
1	70	Radiological Defense (Kinescope)	Kinescope	51.19	49.20
2	59		Training Film	53.81	52.41
3	61	Introduction to Measuring Instruments (Film)	Kinescope	51.10	49.93
4	63		Training Film	51.41	50.92

RESULTS

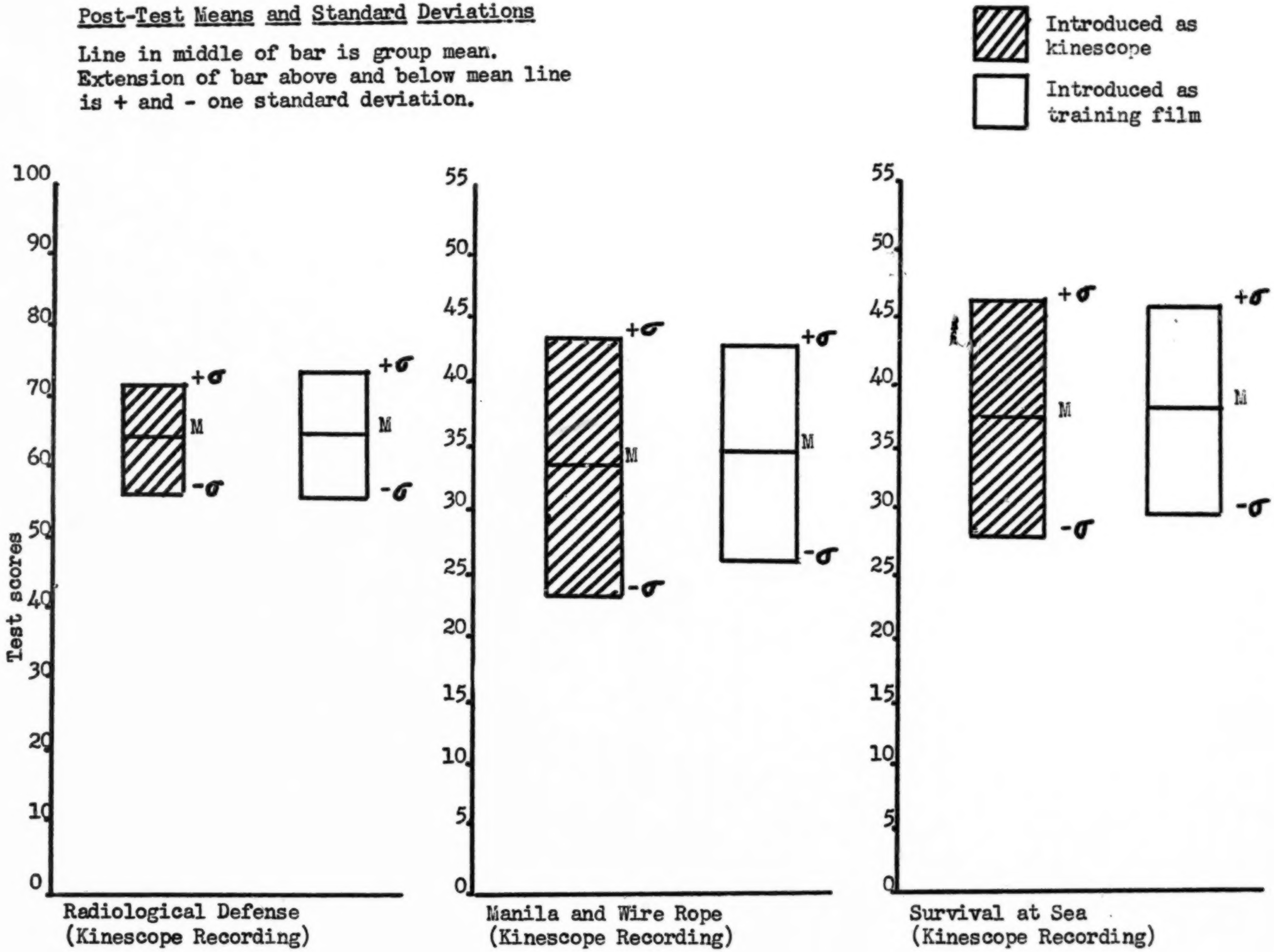
Main Experiment. Results of the main experiment are presented in Figures 1 and 2 and Tables 4 and 5. The analyses of multiple covariance for the main experiment are presented in Tables 1 and 2 in Appendix III.

Of the six comparisons made in the original experiment, none showed a statistically significant difference in learning between groups for the two methods of introduction. Five of the differences were very small. However, for the film *An Introduction to Measuring Instruments*, a difference in mean post-test scores of 38.8 to 31.3 was obtained, the difference being in favor of the "kinescope" group. Although this difference was not statistically significant, it was felt that it would be unwise to ignore a difference in learning of 7.5 points on the grounds that it "may have been due to chance." Consequently, the above mentioned replication was performed. *Radiological Defense* was also replicated because our findings on this film were so much at variance with those of Jackson.

Replication. The results of the replication of *An Introduction to Measuring Instruments* and *Radiological Defense* are given in Figure 3 and Table 6. The analysis of multiple covariance is given in Table 3 in Appendix III.

The replication confirmed the smallness and statistical insignificance of the two methods of introducing the kinescope recording *Radiological Defense*. For the training film *An Introduction to Measuring Instruments* a difference of three points was obtained, this time in favor of the "training film" group, and this difference was significant at the five per cent level of confidence. It will be noted that this difference was in the opposite direction to the difference obtained in the main study which favored the kinescope group. The difference in that instance was 7.5 points--a difference which did not reach acceptable levels of statistical significance. This seemingly inconsistent result could arise from the fact that the method of analysis of covariance maximized the effect of sampling fluctuations in the correlation coefficients of the matching variables with the criterion.

Thus, out of eight comparisons, the reversal observed for two comparisons on the same film might be expected on the basis of sampling differences. Or, in this particular instance, it could be the result of the lack of relevance of this one film (*Introduction to Measuring Instruments*) to the training of Naval recruits, with a consequent lack of motivation to learn from it. This would make their performance more sensitive to fluctuations in their daily training routine which could differentially affect a pair of comparison groups. The great variability of scores obtained in both testings of this film (see Tables 5 and 6) could be caused by variability in motivation.



Post-Test Means and Standard Deviations

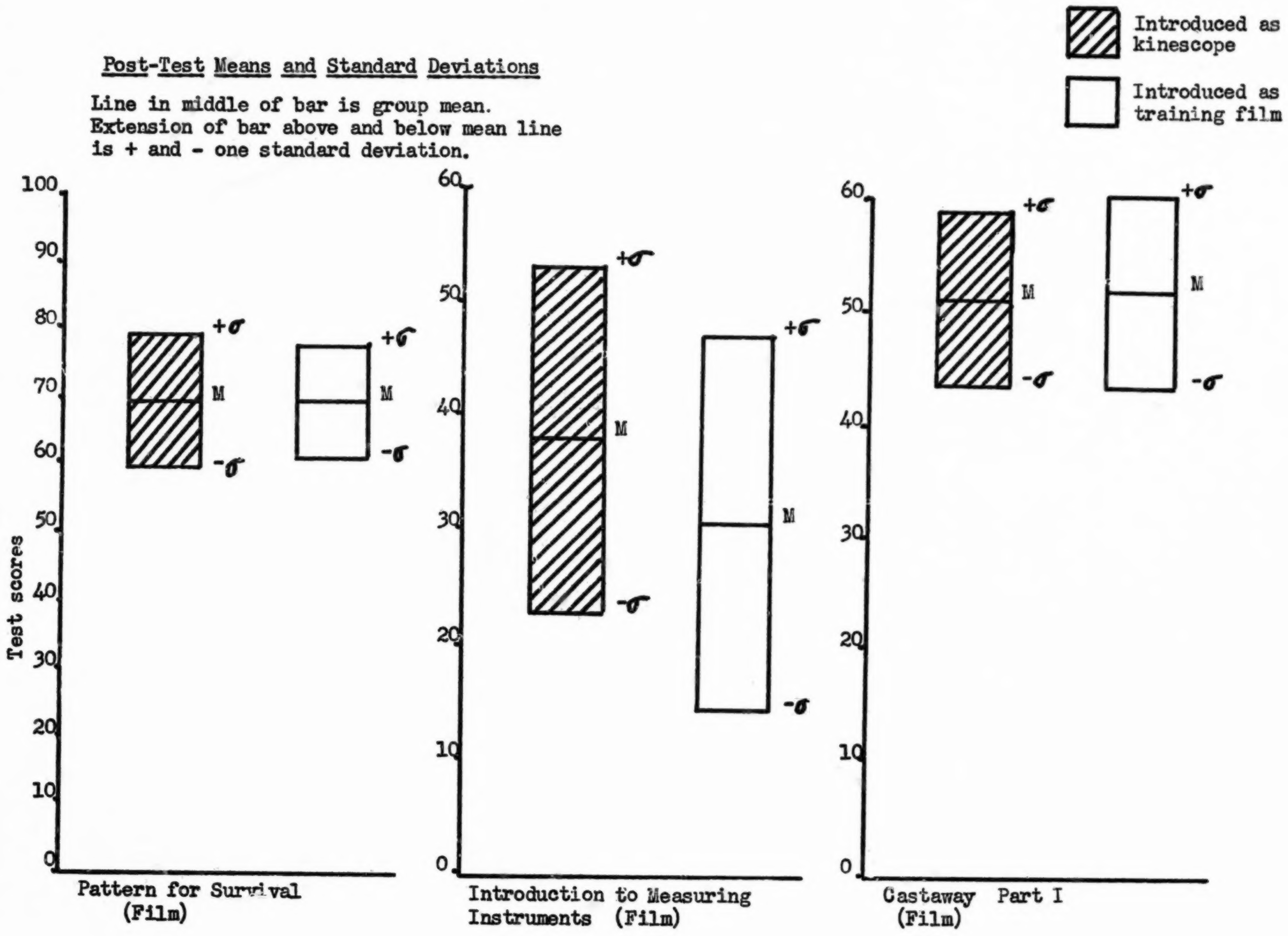
Line in middle of bar is group mean.
Extension of bar above and below mean line is + and - one standard deviation.

Radiological Defense
(Kinescope Recording)

Manila and Wire Rope
(Kinescope Recording)

Survival at Sea
(Kinescope Recording)

Figure 1. Kinescope Recordings - Main Experiment



Post-Test Means and Standard Deviations

Line in middle of bar is group mean.
Extension of bar above and below mean line is + and - one standard deviation.

Figure 2. Training Films - Main Experiment

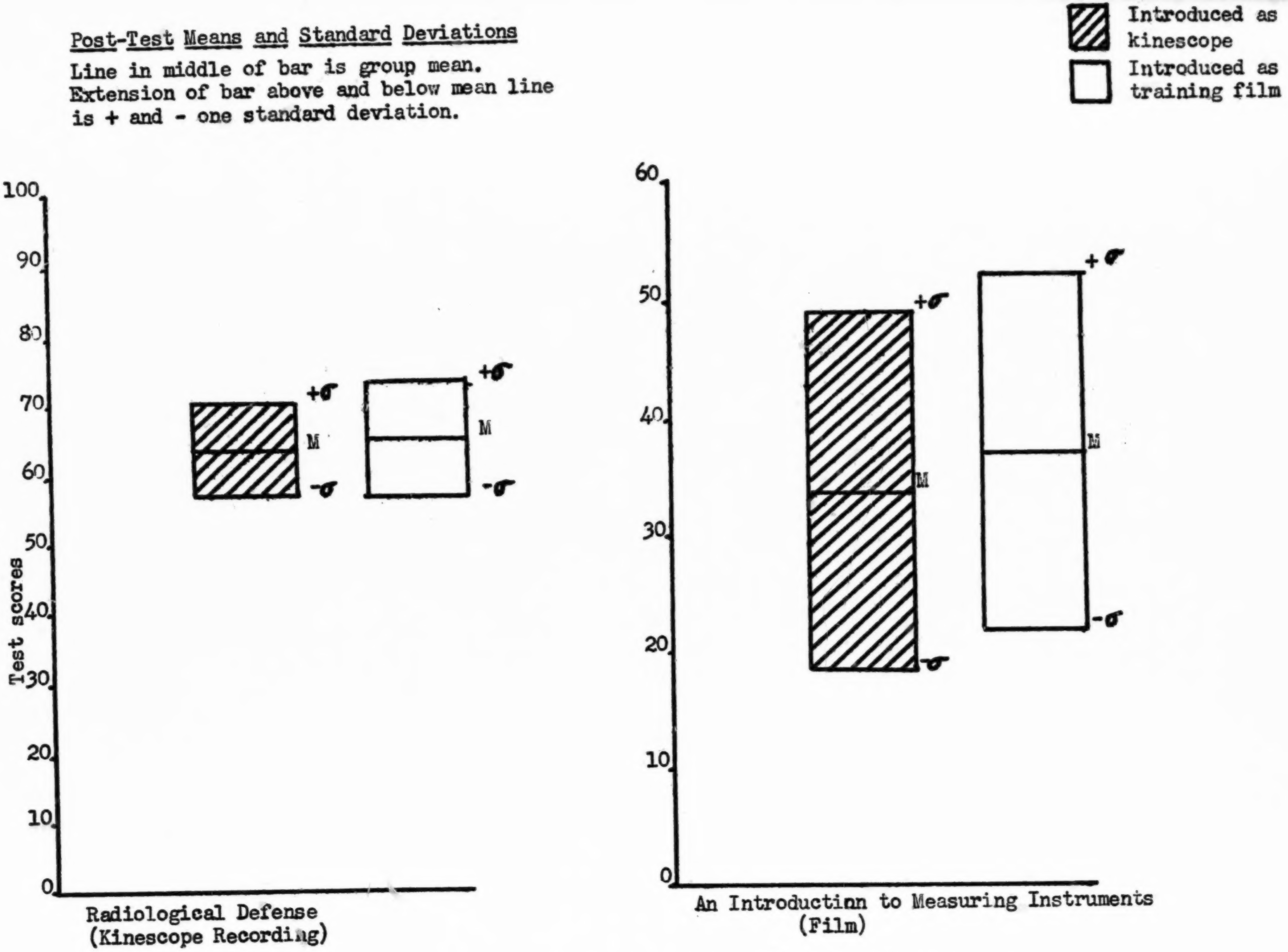


Figure 3. Kinescope and Training Film - Replication

TABLE 4

PRE- AND POST-TEST MEAN SCORES AND STANDARD DEVIATIONS FOR GROUPS SEEING KINESCOPE RECORDINGS (MAIN EXPERIMENT)[1]

Introduced As:	N	Pre-test Mean	S. D.	Post-test Mean	S. D.
		A. Radiological Defense			
Kinescope	56	50.12	6.48	64.37	7.60
Training Film	65	49.97	6.82	64.85	8.82
		B. Manila and Wire Rope			
Kinescope	40	17.87	4.56	33.07	9.92
Training Film	36	20.64	5.60	34.19	8.33
		C. Survival at Sea			
Kinescope	46	16.76	4.10	36.91	9.20
Training Film	43	18.98	5.48	37.67	8.07

---

[1] These are uncorrected means. In view of the small differences between groups on the matching tests, the corrected means would be substantially similar.

TABLE 5

PRE- AND POST-TEST MEAN SCORES AND STANDARD DEVIATIONS FOR GROUPS SEEING TRAINING FILMS (MAIN EXPERIMENT)[1]

Introduced As:	N	Pre-test Mean	S. D.	Post-test Mean	S. D.
		D. Pattern for Survival			
Kinescope	64	55.87	7.18	69.25	9.71
Training Film	66	56.15	6.22	69.32	8.34
		E. An Introduction to Measuring Instruments			
Kinescope	72	19.76	9.87	38.76	15.30
Training Film	67	15.57	7.80	31.28	16.52
		F. Castaway			
Kinescope	65	21.62	4.98	51.69	7.70
Training Film	58	20.45	4.92	52.31	8.55

---

[1] Uncorrected means

TABLE 6

PRE- AND POST-TEST MEAN SCORES AND STANDARD DEVIATIONS[1] (REPLICATION)

Introduced As:	N	Pre-test Mean	S. D.	Post-test Mean	S. D.
A. Radiological Defense (Kinescope Recording)					
Kinescope	70	49.36	4.80	63.96	6.39
Training Film	59	53.85	6.60	65.34	8.32
B. An Introduction to Measuring Instruments (Film)					
Kinescope	61	19.21	10.91	33.86	15.50
Training Film	63	17.71	8.41	36.95	15.30

---

[1] Uncorrected Means

CONCLUSIONS

1) For the population of subjects, and the films and kinescope recordings used in this series of experiments, it makes little or no difference whether a given training film is represented as being a "kinescope recording" or a training film, or whether a given kinescope is represented as being a "training film" or a kinescope recording of a TV program.

2) This study was in no sense a comparison of the teaching effectiveness of training films and kinescope recordings as such. Since we did not have a film and a kinescope presenting the same material we could not compare the instructional effectiveness of a film and a kinescope.

3) A possible reason for the discrepancy between these results and those of Jackson is that the "novelty effect" of television has decreased since the date of his study (1951).

The results suggest however, that substantial learning resulted from seeing all the films and kinescope recordings used in the study, but the exact learning gains, as measured by pre- and post-tests, are not solely dependent on the films or kinescopes, but include also the effect of the pre-tests.[1]

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[1] See Stein, J. J., Technical Report SDC 269-7-35, "The Effect of a Pre-Film Test on Learning from an Educational Sound Motion Picture," The Instructional Film Research Program, The Pennsylvania State University, 1952.

APPENDIX I

Jackson's Instructions

TELEVISION EXPERIMENT

You are about to see a kinescope. A kinescope is a television program that is filmed through a television camera. This television program which you will see was broadcast from the Special Devices Center to train people in atomic defense. We are trying to find out how well this television program trains.

You are asked to take a true-false examination. You will next see the television program. Then you are asked to take the same true-false examination again.

Please mark or circle the "T" on the right of the examination paper if you think the statement is true. Mark the "F" if you think the statement is false.

Put your name on both examination papers. May I repeat that. Put your name on both examination papers.

You are asked to hold your general comments or discussion until after this television experiment is finished.

FILM EXPERIMENT

You are about to see a training film. This film is being used by the Special Devices Center to train people in atomic defense. We are trying to find out how well this film trains.

You are asked to take a true-false examination. You will next see the training film. Then you are asked to take the same true-false examination again.

Please mark or circle the "T" on the right of the examination paper if you think the statement is true. Mark or circle the "F" if you think the statement is false.

Put your name on both examination papers. May I repeat that. Put your name on both examination papers.

You are asked to hold your general comments or discussion until after this training experiment is finished.

APPENDIX II

Sample Instructions Used in the Present Experiment

INTRODUCTION "TRAINING FILM" GROUPS

(Castaway and Survival at Sea)

You are about to see a training film. This film is being used by the Special Devices Center to train people in survival at sea. We are trying to find out how well this film trains.

You are asked to take a multiple choice examination. You will next see the training film. Then you are asked to take the same multiple choice examination again.

Please mark the correct choice on the answer sheet. There is only one right answer for each question. Please do not make any marks on the question booklet.

Put your name on the answer sheet where it says "name." May I repeat that. Put your name on the answer sheet where it says "name."

You are asked to hold your general comments or discussion until after this training film experiment is finished.

Ready, begin.

INTRODUCTION "KINESCOPE" GROUPS

(Castaway and Survival at Sea)

You are about to see a kinescope. A kinescope is a television program that is filmed through a television camera. This television program which you will see was broadcast from the Special Devices Center to train people in survival at sea. We are trying to find out how well this television program trains.

You are asked to take a multiple choice examination. You will next see the television program. Then you are asked to take the same multiple choice examination again.

Please mark the correct choice on the answer sheet. There is only one right answer for each question. Please do not make any marks on the question booklet.

Put your name on the answer sheet where it says "name." May I repeat that. Put your name on the answer sheet where it says "name."

You are asked to hold your general comments or discussion until after this television experiment is finished.

APPENDIX III

Analyses of Multiple Covariance

TABLE 1

ANALYSIS OF MULTIPLE COVARIANCE
POST-TEST
MAIN EXPERIMENT

Source	ΣY^2	df	$1-r^2_{0123}$	Adj. ΣY^2	df	MS	F
A. Radiological Defense							
Between	6.6779	1		31.5274	1	31.5274	< 1
Within	8297.5865	119	.4931	4091.5399	116	35.2718	
Total	8304.2644	120	.4965	4123.0673	117		
B. Manila and Wire Rope							
Between	23.7440	1		11.1627	1	11.1627	< 1
Within	6428.4138	74	.6060	3895.6188	71	54.8678	
Total	6452.1578	75	.6055	3906.7815	72		
C. Survival at Sea							
Between	12.8835	1		1.7721	1	1.7721	< 1
Within	6693.0939	87	.6060	4056.0149	84	48.2858	
Total	6705.9775	88	.6051	4057.7870	85		

(F ratios not marked with an asterisk were not significant at the 5% level of confidence or better.)

TABLE 2

ANALYSIS OF MULTIPLE COVARIANCE
POST-TEST
MAIN EXPERIMENT

Source	ΣY^2	df	$1-r^2_{0123}$	Adj. ΣY^2	df	MS	F
D. *Pattern for Survival*							
Between	.1511	1		.0728	1	.0728	< 1
Within	10630.3181	128	.4816	5119.5612	125	40.9564	
Total	10630.4692	129	.4816	5119.6340	126		
E. *An Introduction to Measuring Instruments*							
Between	1941.9198	1		353.7723	1	353.7723	2.91
Within	35142.5980	137	.4629	16267.5086	134	121.3993	
Total	37084.5179	138	.4482	16621.2809	135		
F. *Castaway*							
Between	11.707	1		96.3412	1	96.3412	2.05
Within	8092.2598	121	.6840	5535.1057	118	46.9076	
Total	8103.9674	122	.6949	5631.4469	119		

TABLE 3

ANALYSIS OF MULTIPLE COVARIANCE
POST-TEST
(REPLICATION)

Source	ΣY^2	df	$1-r^2_{0123}$	Adj. ΣY^2	df	MS	F
			A. Radiological Defense				
Between	61.1330	1		41.7091	1	41.7091	1.15
Within	6942.0917	127	.6479	4497.7812	124	36.2724	
Total	7003.2248	128	.6486	4539.4903	125		
			B. An Introduction to Measuring Instruments				
Between	294.6758	1		428.5691	1	428.5691	4.62*
Within	29411.8079	122	.3757	11050.0162	119	92.8572	
Total	29706.4838	123	.3864	11478.5853	120		

* Significant at the 5% level of confidence

VISUAL PRINCIPLES FOR TRAINING
BY TELEVISION

Human Engineering Report SDC 20-TV-2

Human Engineering Division
Special Devices Center

Report Prepared by:
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For the Special Devices Center:

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T. B. Haley, ~~Captain~~, USN
Commanding Officer and Director

OFFICE OF NAVAL RESEARCH
SPECIAL DEVICES CENTER
HUMAN ENGINEERING DIVISION

Effective training by television depends upon an understandable TV picture. Poor images on TV receivers are often caused by the design of the materials being shown. This study discovered why some training devices are easy to see on television and why some are difficult to see.

Thirty-one principles of visual design were discovered to effect the clarity of a TV picture. They are listed and described in the text.

Recommendation:

While these results are not the last word on the subject, at the moment they are the best. It is recommended

1. That these principles be applied in preparing visual material for TV training.

2. That these principles be applied to training devices to make them effective in future TV use.

Robert Jackson
Robert Jackson

J. Sanford Davis Ph.D.
Head, Applications Research Section

C. P. Seitz, Ph.D.
Head, Program Branch

VISUAL PRINCIPLES FOR TRAINING BY TELEVISION

SUMMARY

One hundred and five training devices made by the Special Devices Center were tested for visibility on television. Twenty-six of these devices gave an understandable TV image. Twenty-six were difficult to see on the TV receiver.

The visually good and poor devices were studied to find what aspects of design caused these results. Out of the study came thirty-one principles to ensure an understandable TV image for training devices and training material.

These thirty-one visual principles are listed in brief:

1. The figure (the principal part to be seen) should be organized in a horizontal movement from left to right.
2. Three horizontal planes of organization give best visibility.
3. Radial-type organization is effective. Circular or oval organization, however, should be avoided.
4. Vertical organization should be avoided.
5. Simple organization is best.

6. Moving parts of a device should operate slowly.

7. A light figure on a dark background is best.

8. The figure should extend approximately over two-thirds of the background.

9. The device should have a border or surround area of approximately one-third of the total area.

10. Dull light grey tones against dull dark greys give best contrast.

11. Where several contrasts are needed, it is best to work from dark to light, to dark to light, etc.

12. Avoid either too great or too little contrast in grey shades.

13. Avoid glazed or reflecting surfaces.

14. Avoid translucent materials.

15. Rough surfaced wood and paper give the best visibility.

16. Transparent glass or plastic gives an illusion of transparency.

17. Dull or tarnished brass gives an illusion of metal.

18. Very large or very small devices can be used equally well.

19. Height-to-width ratios should be from 3x4 to 4x4.

20. Detail must be proportional to total size of device.

21. Small devices should be designed so hand will not conceal them.

22. The height of letters and numbers should be approximately $\frac{\text{height-of-device}}{15}$.

23. The width of letters and numbers should be approximately $\frac{\text{width-of-device}}{25}$.

24. Stroke width of letters and numbers should be approximately $\frac{\text{width-of-device}}{100}$.

25. Letters and numbers should be separated by approximately one stroke width.

26. The above four rules should be applied to other detail as far as possible.

27. Letters, numbers and important detail should always be light against a dark background.

28. Three dimensional objects should be surrounded by as much air as possible.

29. Charts should be substituted for cutaways.

30. Light yellow against dark red or dark blue gives good contrast.

31. Light yellow surrounded by air is excellent for three dimensional devices.

VISUAL PRINCIPLES FOR TRAINING BY TELEVISION

INTRODUCTION

I. The Problem

Television communication is basically words and pictures. The image on the TV receiver, the picture, is important to effective training by television. Some training devices made at the Special Devices Center have not been understandable when used on television. This study attempts to discover why.

If the TV image is clear, the television medium gives three main advantages to mass training:

A. Position

The TV camera can view an object from many angles uncommon to the human eye. The camera can move above the object, view it from a greater distance, closer up, etc. If two or more cameras are used, the viewing angle can be changed rapidly.

B. Amplification

The TV camera can enlarge a small object or details of an object. A hypodermic needle, for instance, can be shown several times its normal size. The reverse of this is that large objects or details appear smaller.

C. Organization

The TV camera can focus attention on objects or details and eliminate extraneous objects. Background and objects in the natural setting which may distract attention are not seen.

To secure these advantages for mass training by television, this study was designed to discover visual principles which would produce an understandable TV picture. To do this two basic questions were asked:

A. Do the visual characteristics of a training device make an important difference in TV visibility?

B. If true, what are the visual principles involved?

EXPERIMENTAL DESIGN AND PROCEDURES

I. Task

One hundred and five training devices were rated for visibility when viewed on a television screen. In rating the devices, all factors except the devices were held as constant as possible. This was done as follows:

A. The same TV equipment was used throughout the study. This was two cameras, two flood lights, control equipment, and one receiver connected by closed circuit. The same technicians operated the equipment.

B. The same instructor demonstrated the devices in nearly all cases.

C. The same twelve viewers rated the devices in nearly all cases. When substitutions were made among the viewers, records were kept of the newcomers' deviations from the mean ratings.

II. Procedure for Estimating Visibility

The visibility of the TV images of the training devices was estimated by use of rating scales prepared for the purpose. The rating schedule contained fourteen five-point scales. These covered the following points of TV visibility:

A. Outline of the TV image.

B. Verisimilitude or realism of the image.

C. Details in the image.

D. Contrasts in the image.

E. Moving parts in the image.

F. Principles to be learned from the image.

G. Interests in the image.

H. General like-dislike response to the image.

Validity of the rating schedule was checked, for one thing, by the distribution of the ratings. This approximated the normal. Reliability was checked by both the split-half and repeat methods.[1]

III. Rating Panel

The rating panel was made up of twelve employees of the Special Devices Center. These persons were familiar with the general problems of training with audio-visual devices. They were not television experts.

The rating panel met twenty-one times, rating five training devices at each session. One to three substitutions were made on the panel at ten of the sessions.

IV. The Visual Characteristics

After 105 training devices were rated, the first phase of the study was complete. The next part was to discover the visual characteristics responsible for these ratings.

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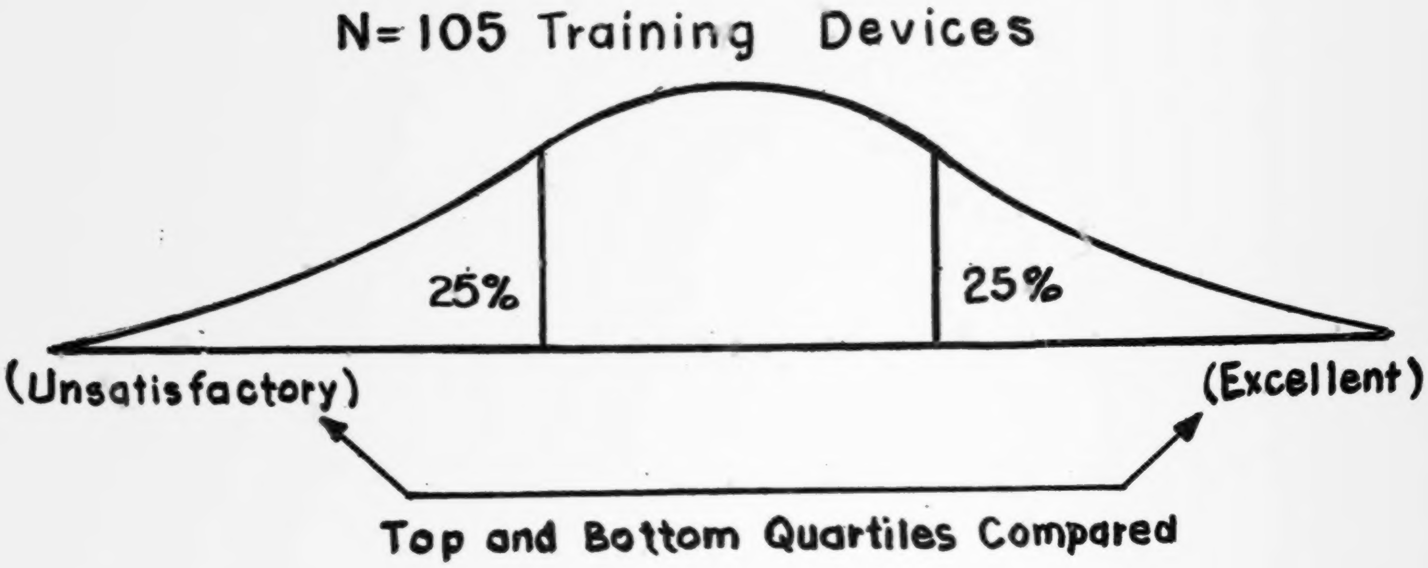
[1] Reliability coefficients ranged from .85 to .96.

The devices rated excellent on visibility were compared with the devices rated unsatisfactory on visibility. The twenty-six most visible and the twenty-six least visible devices were studied for several months.

This comparison of the top 25 percent and the bottom 25 percent of the devices is diagrammed below:



Bringing the best and worst devices together pointed up regularities within each group and differences between them. As impressions were formed of these regularities and differences, they were put down in tentative form.

A visual characteristic was determined basically by comparing the two groups. For instance, twenty-four of the best devices had a light figure on a dark background. None of the worst devices had such a design characteristic. A light figure on a dark background was thus considered an important finding.

Eighteen of the best devices were organized horizontally. Five of the best devices had a radial-type organization. None of the worst devices had either type of organization. Hence, both horizontal and radial-type organizations were considered characteristics of training devices which are highly visible on television.

V. Checking the Visual Characteristics

After as many principles of good TV visibility were set down as could be discovered, they were checked as follows:

A. Three of the worst devices were revised in accordance with the principles. They were re-rated. The new ratings were tested against the old for significance of difference.[1]

B. A new training device was made embodying nearly all the principles. It was rated and evaluated for visibility.[2]

C. Predicted ratings based on these principles were made for devices about to be rated. The predicted and actual ratings were correlated.[3]

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[1] The three t's = $<$ .01.

[2] The device was rated "excellent".

[3] R = .90.

D. These principles were discussed with some twenty artists, designers, and technicians with wide TV experience.

V. The Procedure Summarized

The entire study was done in the following steps:

A. Standardizing the rating schedule.

B. Rating the training devices.

C. Comparison of the extreme quartiles.

D. Checking the visual principles.

From this procedure came thirty-one visual principles for training devices used on television. They are set out in the following section.

RESULTS AND CONCLUSIONS

I. Areas of Visibility

The principles of television visibility found in this study are grouped in eight general areas:

A. Organization

Principles of organizing the visual presentation.

B. Figure to Ground

Principles giving visibility to part to be seen against its background.

C. Contrast

Principles making one grey scale visible against another.

D. Materials

Materials lending themselves to TV visibility.

E. Size

Principles of size and proportion.

F. Detail

Proportions of detail in relation to total device.

G. Depth

Principles for creating an illusion of three dimensions.

H. Color

Use of color for effective grey-scale visibility.

II. The Visual Principles

A. (Organization)

1. The figure (the principal part to be seen) should be organized in a horizontal movement from left to right.

   Eighteen of the best devices were organized horizontally. None of the worst devices were so organized. Two reasons for this are:

   a. The TV camera scans horizontally from left to right.

   b. The normal eye movements of Americans are from left to right in a horizontal plane.

2. Three horizontal planes of organization give best visibility.

   Ten of the eighteen best devices with horizontal organization had three planes. Eight had two or four such planes. Three horizontal planes give optimum visibility.

3. Radial-type organization is effective. Circular or oval organization, however, should be avoided.

   Five of the best devices had a radial-type organization. A good example was a cutaway chart demonstrating a Wright Whirlwind engine. Sixteen of the worst devices had a circular or oval organization. The TV camera distorts circular and oval forms which disturbs visibility. Corners should be square whenever possible.

4. Vertical organization should be avoided.
Many of the worst devices were organized vertically in whole or in part. One otherwise excellent device had one word printed vertically which lowered its rating. Even a small amount of vertical organization is to be avoided. When vertical organization cannot be avoided, the detail or lettering should be as large as possible.

5. Simple organization is best.
All of the best devices were observed to be more simply organized than any of the worst. This rule applies to number of details, ideas, shades of grey, etc. Devices which are "busy" in background or figure are hard to see on television. Devices demonstrating one or two ideas are easier to see than those demonstrating more than two.

6. Moving parts of a device should operate slowly. On close-up shots the TV camera makes any movement seem faster. As a general rule movement before the camera should be slower than would be necessary on immediate presentation. This is not to suggest that movement should be avoided. Slowly moving parts were quite effective in the tests. No disturbance of general visibility was found.

B. (Figure to ground)

7. A light figure on a dark background is best. The parts or detail which it is important to see should be lighter on the TV receiver than their background. Twenty-four of the best devices produced images on the receiver which showed the important detail lighter than the background. This is considered the most important principle of TV visibility which was found.

8. The figure should extend approximately over two-thirds of the background. Nearly all best devices presented detail covering approximately two-thirds of the two-dimensional area visible on the TV screen. Skilled cameramen will usually provide this kind of a

picture where the frame is not a part of the device.

9. The device should have a border or surround area of approximately one-third of the total area.

This is a re-statement of principle number 8. One simple rule for laying out the border or surround is to estimate one-third of the area and mark off an even border which approximates this. The border will appear smaller than might be thought. There are two reasons why a fairly large border is important:

a. The TV image tends to flicker around its edges.

b. The human eye perceives detail easily only against a sufficient background.

C. (Contrast)

10. Dull light grey tones against dull dark greys give best contrast.

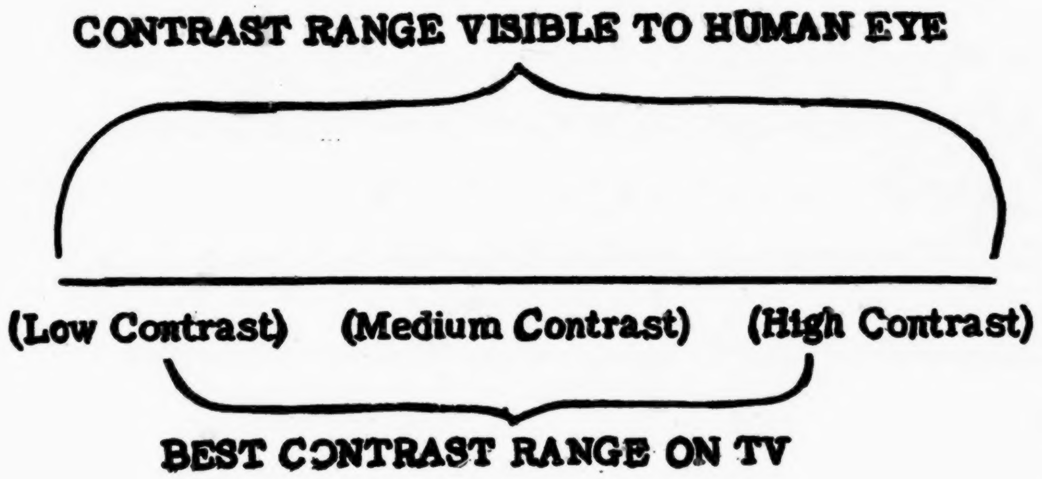
The TV camera reports an image in about ten distinct shades of grey. A dull light grey against a dull dark grey, both falling within the middle ranges of the TV shades, give the best contrast. About three steps difference on a standard TV grey scale gives excellent contrast.

11. Where several contrasts are needed, it is best to work from dark to light, to dark to light, etc.

When several shades of grey are used, these shades should not be progressively lighter. The designer may use a dark grey, then a light, then a dark grey again, next a light, etc. This permits a more flexible design, and excellent contrast will be obtained.

12. Avoid either too great or too little contrast in grey shades.

Pure white against jet black is as bad for TV visibility as a very small difference in grey scales. As stated above, greys falling within the middle ranges of the grey scale give the best contrast. The TV camera sees a much more limited range of contrast than the human eye. This can be diagrammed as follows:


CONTRAST RANGE VISIBLE TO HUMAN EYE
(Low Contrast)
(Medium Contrast)
(High Contrast)
BEST CONTRAST RANGE ON TV

D. (Materials)

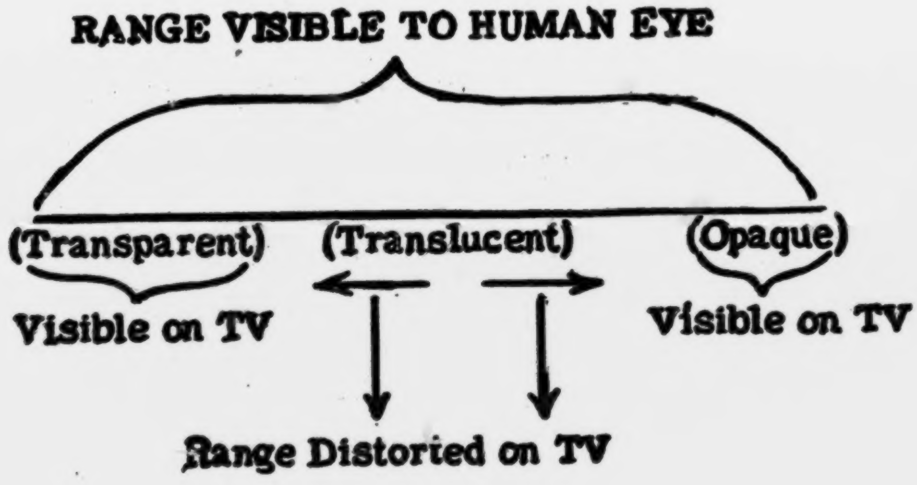
13. Avoid glazed or reflecting surfaces.

Surfaces casting highlights or tending to mirror surrounding objects were found unsuitable for TV. Such surfaces must be dulled before good visibility can be expected. One simple rule for testing a surface is to hold the hand before it in a bright light. If any reflection appears, the surface should be dulled.

14. Avoid translucent materials.

Translucent materials are defined as materials which are partially transparent. The TV camera does not report such materials accurately. The TV image of translucent material is likely to be distorted. The human eye is capable of seeing materials which range from almost completely transparent, through translucent, to completely opaque. The TV camera reports faithfully only the two extremes of this continuum, the transparent and the opaque. Translucent material will be reported by the TV camera as either transparent or opaque. Because of difficulty in predicting which will be reported, it is best to avoid translucent material.

Rear screen projections, which are mildly translucent, will be reported as opaque. Most translucent plastic material will be reported as transparent. This can be diagrammed as follows:


RANGE VISIBLE TO HUMAN EYE
(Transparent)
(Translucent)
(Opaque)
Visible on TV
Visible on TV
Range Distorted on TV

15. Rough surfaced wood and paper give the best visibility.

The best devices in this study were made of fairly rough-surfaced wood or paper. Uneven surfaces tend to break up reflections which improves visibility.

16. Transparent glass or plastic gives an illusion of transparency.

The TV camera will usually report an illusion of transparency when a transparent material is used alone. However, when it is framed closely against an opaque background, the transparent material disappears and only the opaque image is reported. The difficulty in using transparent materials is the probability of getting highlights or reflections. If used, the surface should be sprayed with wax or dulled in some manner.

17. Dull or tarnished brass gives an illusion of metal.

Metal objects tend to appear distorted if highly polished. Dull or tarnished brass works well. Brass comes out rather dark on the TV screen and should be used against a lighter background.

E. (Size)

18. Very large or very small devices can be used equally well.

The largest and smallest devices tested were found among both the best and worst devices in the study. A device which fits in the palm of the hand or one 10 feet square can be used equally well. Convenience and portability are the only considerations in overall size. It must be remembered that while the TV camera will magnify detail on small devices, it will also reduce detail on large ones.

19. Height-to-width ratios should be from 3x4 to 4x4.

A majority of the best devices had a height-to-width ratio of 3x4. TV experts generally favor a 3x4 ratio. Several excellent devices, however, were square in shape. Extremes from these ratios must be avoided as they give poor visibility.

20. Detail must be proportional to total size of device.

A question frequently asked is how large detail of a device should be. For television, the answer lies in the relation of the detail to the total size of the device. Detail easily seen of a small device could not be seen on a large device. Close-up shots of small detail on large devices do not overcome this handicap. (See #22 and ff.)

21. Small devices should be designed so hand will not conceal them.

This simple rule is frequently overlooked. Several small devices were low in visibility because it was impossible for the demonstrator to avoid concealing them. One solution is to make a small device so that it can be operated with a pointer.

F. (Size of Detail)

These principles were found by measuring the best devices with a height-to-width ratio of 3x4. Judgment should be used in applying the principles to devices which vary from this ratio.

22. The height of letters and numbers should be approximately $\frac{\text{height-of-device}}{15}$.

If a device were 15"x20" in total size, the height of letters and numbers on it should be $\frac{15}{15}$ or about one inch.

23. The width of letters and numbers should be approximately $\frac{\text{width-of-device}}{25}$.

Using the 15"x20" device as an example, the width of letters and numbers on it should be $\frac{20}{25}$ or about 4/5 of an inch.

24. Stroke width of letters and numbers should be approximately $\frac{\text{width-of-device}}{100}$.

Stroke width refers to the width of the line used to form letters and numbers. Using the 15"x20" device again, the stroke width of letters and numbers on it should be $\frac{20}{100}$ or about 1/5 of an inch.

25. Letters and numbers should be separated by approximately one stroke width.

This rule can be applied flexibly to such letters as A, W, etc. It was found that letters and numbers crowded consistently closer than this rule were difficult to read.

26. The above four rules should be applied to other detail as far as possible.

If the size of any small detail does not conform with the size suggested for letters and numerals (as indicated in the above four rules) it will not be visible. For example, if buttons on a uniform must be visible, their size would be determined by the above four rules. Therefore, a human figure shown wearing a uniform with visible buttons would be larger than if only the gross outline of the figure were needed.

27. Letters, numbers and important detail should always be light against a dark background.

This principle needs to be emphasized particularly for reading material on a device.

G. (Depth)

28. Three dimensional objects should be surrounded by as much air as possible.

This principle simply means that a good illusion of three dimensions can be obtained if the object is suspended in space. For instance, a model airplane suspended from a wire will give a better three-dimensional illusion than if laid on a table or framed against a vertical background. If the air background can be made somewhat darker than the object, the illusion will be heightened.

29. Charts should be substituted for cutaways.
All cutaway devices (three dimensional construction) tested in this study proved unsatisfactory. However, charts of cutaway equipment were excellent if conforming to other principles of visibility.

H. (Color)
The use of color on television proved such a complex subject that detailed findings will be given in a supplementary report. Contrary to popular opinion, this study found that color added nothing to grey-scale rendition on the TV receiver. It is suggested that unless color is needed for other reasons, devices be prepared in the appropriate shades of grey.

30. Light yellow against dark red or dark blue gives good contrast.
One device testing excellent on visibility

had a red gear wheel set on light yellow and framed in grey-blue. **Another** consisted of light blue beads moving against a yellow-tan background. For a simple two-tone contrast light yellow against dark blue is superior.

31. Light yellow surrounded by air is excellent for three dimensional devices.

A large model airplane painted light yellow and suspended from a boom without backdrop gave an excellent illusion of three dimensions. Yellow is reported as light grey by the TV camera and should be used against a somewhat darker background.

III. Conclusions

Two questions were asked at the beginning of this study:

A. Do the visual characteristics of a training device make an important difference in TV visibility?

B. If true, what are the visual principles involved?

The answer to the first question is affirmative. The visual characteristics of a training device will affect TV visibility regardless of how well TV equipment and personnel perform.

Thirty-one visual principles were found in answer to the second question. Checks made in the study show that application of these principles will improve the TV visibility of a training device.

It should be noted that one-half of the training devices tested were not studied for visual design. Certain principles that might have been learned from the two middle quartiles have been missed. No pretense is made that the findings are exhaustive or conclusive.

Practical limitations in military training may make it impossible to apply all the thirty-one principles here reported. In such cases as many should be followed as possible. It can be predicted that the more these principles are applied, the better will be TV visibility.

TECHNICAL REPORT - SPECDEVCEN 269-7-38

EVALUATION OF TWO KINESCOPES

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SPECDEVCEN Project 20-E-4
Contract N6onr-269

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12 October 1953

For the Special Devices Center:

Harry Sosnoski

Harry Sosnoski, Captain, USN
Commanding Officer and Director

Instructional Film Project
Distribution List

SPECIAL DEVICES CENTER
OFFICE OF NAVAL RESEARCH
HUMAN ENGINEERING DEPARTMENT

Introduction:

This research was conducted in a limited period of time using rapid evaluation techniques that may not be as reliable as the techniques usually employed. While this type of evaluation meets the need for rapid appraisal we cannot accept the findings with as much certainty of correctness as a controlled research study would permit.

Problem:

A series of television programs telecast to the Naval Reserve was recorded on film. In planning for further use of these films (kinescopes), it became important to know whether they were as effective for training as conventional training films. This research was conducted to give a rough indication of their effectiveness in comparison with standard films, and to what extent the characteristics of a good film had been incorporated in them.

Results:

1. The two kinescopes were rated to be at least as effective in the communication of information as the average training films that had been studied.

2. A panel of officers trained to evaluate films gave each of the two kinescopes a rated score which was above the mean rated score of the conventional films which had been studied.

3. Ratings of learning from individual sequences showed that the two kinescopes were effective in this respect.

Recommendation:

Kinescope recordings should be used as training films.

Loran C Twyford Ph.D.
Project Engineer

J Sanford Davis Ph.D.
Head, Research Branch

C. P. Seitz
Head, Psychological Research
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THE EVALUATION OF TWO KINESCOPES

by

Robert E. Stover and Daniel G. Tear

The Instructional Film Research Program
The Pennsylvania State College

INTRODUCTION

In June 1952 the Instructional Film Research Program was requested by Special Devices Center to evaluate two kinescope recordings of television programs, Survival at Sea and Manila and Wire Rope, as training media relative to conventional training films.

Methods of Evaluation

In order that some basis for an objective evaluation could be obtained, a meeting was arranged for a panel of trained experts to evaluate these kinescopes on a special rating form which is being developed by the Instructional Film Research Program (Film Analysis Form C).

This panel consists of 25 Naval Reserve Officers of Naval Reserve Research Company 4-4 of The Pennsylvania State College. These reserve officers are faculty members from various departments who have been undergoing training in the rating of instructional motion pictures since October 15, 1951. The training has been conducted by the Instructional Film Research Program and has covered a comprehensive range of objective criteria for rating films. The training has been based only upon those criteria which have been experimentally shown to contribute to the teaching effectiveness of instructional films.

Accompanying the training of this panel was the development of a rating form. In its present state of development the form consists of 41 criteria upon which a film is rated. Although this film analysis form is not yet final, it has been found to have a reliability of +.77 and a validity coefficient of +.60 in the hands of this trained panel for a limited group of films.[1]

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[1] Film Analysis Form C is included in the Appendix. It is undergoing revision and should be used with caution in its present state of development.

The two kinescope recordings were accordingly shown to this panel, twelve members of which were present, and their ratings were collected on the Instructional Film Research Program's Film Analysis Form C. Inasmuch as these were not the usual kind of training films, any comments that the judges wished to make were also collected.

In addition, a second analysis was made of the two kinescopes to determine which sections were most effective and which were least effective in communicating information. Using the Film Analyzer (see Technical Report SDC 269-7-15), a technique similar to that developed by Twyford (see Technical Report SDC 269-7-23) gave ratings of the relative teaching effectiveness of each part of the kinescope. The fifteen members of the reserve group that were present for this phase of the study were asked to assume the role of an "average boot" which, they decided by group discussion, could be characterized as a person of "average intelligence" who was "willing to learn." Assuming this role, they judged if the scene they were viewing had (1) maximum, (2) somewhat less than maximum, (3) average, (4) little but some, (5) no effect on learning.

A continuous record was made by the Film Analyzer of the judgments of each of the 15 members of the group. The polygraph records were analyzed and compiled into the tables given below.

RESULTS

Results of Evaluation Using the Film Analysis Form

The overall impression that these kinescopes made on the judges was very good. This was confirmed by the mean total rating scores which were 189.75 for Manila and Wire Rope and 188.75 for Survival at Sea. The total possible score for a film is 246. These present scores compare very well with the rating scores of other training films. Since the evaluation form is not finalized, the sampling of films upon which scores have been obtained is necessarily too small for percentile norms to have been established. The scores for these two kinescopes, however, are above the mean of those films which have been rated thus far. The mean score of all training films which have been rated on this form is 181.25.

The ratings on particular criteria of the analysis form point up specific strengths, and also three areas where improvement is considered possible in these kinescopes. Both were rated as being very clear in their objectives and manner of approach.

Both kinescopes were also given high ratings as to their content being up-to-date. The panel felt this to be a particular advantage of kinescopes as compared to regular training films. The rate of presentation of material was judged to be very well suited to the nature of the material and the verbal difficulty of the commentary was deemed appropriate to the age and educational level of the target audience.

One point on which both kinescopes might be improved relates to criterion 12, "Is the material or task shown as the individual would perceive it in a life situation or during an actual performance?" The full potentialities of kinescopes might be better realized if the action and events were presented from the viewpoint of a trainee in an actual performance situation. The judges also rated both kinescopes fairly low on criterion 13, which refers to previous knowledge of the target audience. They thought that both kinescopes could perhaps have made more use of events related to the previous experience of the target audience. The third point noted for possible improvement was criterion 14, "Is the treatment made as personal as possible?". The panel felt that the kinescope did not seem to produce maximum involvement of the viewers by making the treatment as personal as it could be.

The judges rated the kinescopes quite high on the other 38 criteria. There are, of course, many differences between the two on specific criteria. This is to be expected since they are on entirely different subjects. Any one type of treatment will vary in effectiveness of presentation as it is used with different subject matter.

One of these differences was on criterion 15 which applies to repetition of the important content. *Manila and Wire Rope* was rated higher on this point, and also on criterion 17, which refers to sound effects being perceived as authentic and realistic. On criterion 19, *Manila and Wire Rope* was again the higher of the two, relative to the details of the information or demonstration being clearly emphasized by the commentary.

On criterion 32, however, *Survival at Sea* received the higher rating. This criterion pertains to the impression of realism given by the pictorial presentation. The judges also rated *Survival at Sea* higher on criterion 39 as being more suited to effective treatment by the kinescope medium. Of the two, *Manila and Wire Rope* was rated lower on criterion 40 as being more feasible and economical to present by some other means.

The analysis of the written comments and the discussion of the kinescopes by the judges brought out the following points. In Survival at Sea the panel was quite impressed by the sincerity of the presentation. They felt that the realism and lack of smoothness in presentation would be very favorable in getting the target audience to accept the kinescope as giving them the actual up-to-date facts with no attempt at staging or faking. They thought that the use of the introduction by the captain added very little to the effectiveness of the kinescope and felt that if scenes of abandoning ship were to be used, they should be made more realistic. It was considered that the best use of this kinescope in its present form would be motivational rather than strictly informational. If the kinescope were to be used strictly for information, the panel agreed that more items in the survival kit should have been shown and demonstrated.

In Manila and Wire Rope, the panel was of the opinion that this particular subject matter might perhaps be more feasibly and economically taught by a live instructor with small groups. They were well aware, however, that the pressure of time or other exigencies might well require the instruction of large groups by films or kinescope recordings. In this case, they then thought there should be shipboard scenes illustrating the actual uses and practices which are to be taught. The judges were very favorably impressed by the repetition and review which were used here. They felt, however, that the historical scenes were of doubtful value.

Despite these several possible improvements, the judges felt that the two kinescopes in their present form would be quite effective as training instruments. As was mentioned earlier, the judges mean ratings of these kinescopes were slightly above the mean ratings of a number of training films which had been analyzed previously.

Results of Evaluation Using the Film Analyzer

In an effort to get some measures of the strong and weak points of the two kinescopes from a teaching standpoint, the Film Analyzer was used. The members of the panel rated each kinescope as it was being projected in terms of the amount of learning they judged would occur. The panel rated on a five category scale: (1) maximum learning, (2) somewhat less than maximum, (3) average learning, (4) little but some learning, (5) no effect on learning.

The results of this analysis are presented in Tables 1 and 2. These tables are arranged as follows: Column 1 indicates the time elapsing during which the rating in Column 2 was obtained. A "max" rating was given if eight of the 15 judges indicated that the "average boot" would learn as described in categories 1 and 2. If eight of the 15 judged categories 4 or 5 as appropriate, a "min" rating was given. If eight raters chose neither a combination of categories 1 and 2, nor 4 and 5, the group rating was considered "ave." All 15 raters indicated their ratings at all times during the showings of the kinescopes. The figures in Column 3 are the ratios of the average number of group members rating the learning effectiveness in low categories 4 and 5 to the average number rating in high categories 1 and 2 during any "max," "ave," or "min" trend. The number in each category was observed every 10 seconds. The fourth column is a description of the action taking place during each time interval.

Some of the observed results of this aspect of the study may be interpreted as follows. The part of the kinescope, Survival at Sea, which was most effective (2/9.7, 2/9.8, 1/10.5) was the Chief's demonstration of the life jackets. However, the portion of the same demonstration where life raft equipment was being displayed was voted by most of the raters as having little teaching effectiveness (11/.66). The introduction by the Captain received a low rating (11.3/.45), as did the testimonial (9.6/2.1). Two hundred ten seconds were rated as "max" and 424 seconds as "min" for the total running time of the kinescope (1544 seconds), with the remainder, of course, being average.

Manila and Wire Rope tended to receive more "ave" ratings; 150 seconds were rated as "max," while 306 seconds received a "min" rating. The "max" ratings were obtained for the explanation and description of a fathom and the title card demonstrations of the rules for handling line. "Min" ratings were given to the introductory film and talk as well as to the repetition of that film. Generally the number rating in categories 1 and 2, and in 4 and 5 was less than in Survival at Sea.

In both kinescopes, many of the "min" spans were continuity sequences needed to make the action meaningful. It must be remembered that only one aspect was being considered here; that is, "If I were an 'average boot', would I be learning at this point of the kinescope?" Thus, learning was taking place when "ave" ratings occurred as well as when "max" ratings were given. We may say, therefore, that 75% of Survival at Sea and 81% of Manila and Wire Rope was effective in communicating information and that some of the remainder which received "min" ratings was necessary for continuity.

TABLE I

SURVIVAL AT SEA

1 Time Span (Seconds)	2 Group Ratings	3 Ave No. Votes In Lo & Hi Categ.	4 Event
0-110	Min.	11.3/.45	Captain's talk, Introduction by speaker
120-180	Ave.	6.7/2.7	Begin talk
190-210	Min.	9.6/.33	Introduction of chief
220-230	Ave.	4.5/4.5	First words by chief
240-290	Max.	2/9.5	Begin demonstration by chief
300	Ave.	3/7	Demonstration by chief of the kinds of life jackets how to put them on, how to inflate them
310	Max.	3/8	
320	Ave.	2/7	
330-350	Max.	2/9.7	
360-370	Ave.	4.3/6.3	
380-430	Max.	2/9.8	
440-450	Ave.	3/6.5	
460-490	Max.	1/10.5	
500	Ave.	5/4	Demonstration of immersion suit
510	Min.	10/2	End of first part of talk
520-540	Ave.	6.3/2.3	
550	Min.	9/1	Begin demonstration of life raft
560	Ave.	6/3	Demonstration of life raft
570-590	Min.	11/.66	Demonstration of life raft equipment
600-660	Ave.	2.7/4.6	
670	Max.	1/8	Demonstration of water distiller
680-770	Ave.	4.8/3.8	Resume demonstration of other life raft equipment
780	Min.	13/0	End of demonstration of equipment
790	Ave.	7/3	Overall view of life raft, review
800-830	Min.	11.6/1	Preparation and setting off of flare
840-860	Ave.	6.3/1	Film and introduction to Part II
870-880	Min.	9/1.5	"Part II" card
890-930	Ave.	4.6/4.6	Film of men going over side
940	Min.	8/4	"Part III" card
950	Ave.	5/5	Beginning of film of men jumping into fire
960-980	Max.	2.3/8.7	Swimming in burning oil
990	Ave.	5/5	Under water explosion

TABLE I (Con't)

SURVIVAL AT SEA

1 Time Span (Seconds)	2 Group Ratings	3 Ave No. Votes In Lo & Hi Categ.	4 Event
1000	Max.	2/8	Swimming on back to protect self from under water explosion
1010-1030	Ave.	2/6	Fastening life rafts together
1040-1050	Max.	2.5/8	Getting wounded on life raft and how to swim in rough sea
1060-1110	Ave.	4.3/4.8	Review
1120-1250	Min.	9.6/2.1	Testimonial
1260-1480	Ave.	*	Review
1490-1544	Min.	*	Captain's final remarks

* Due to mechanical difficulty with the polygraph recorder only trends could be determined from 1260" - 1544".

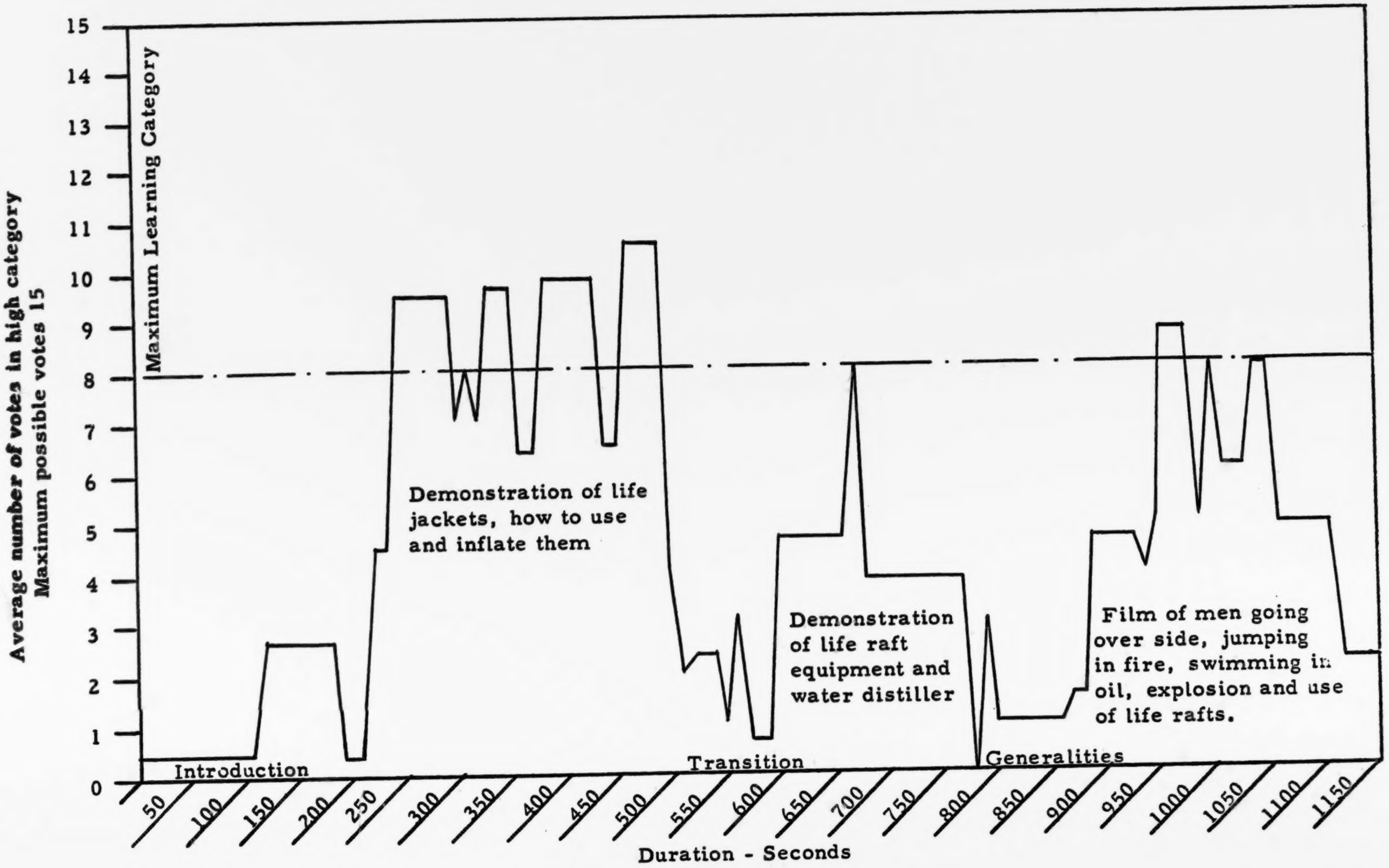

Figure 1 Profile of Kinescope "Survival at Sea"

TABLE 2

MANILA AND WIRE ROPE

1 Time Span (Seconds)	2 Group Ratings	3 Ave No. Votes In Lo & Hi Categ.	4 Event
0-150	Min.	11.4/0.4	Introduction film and talk
160-260	Ave.	2.5/1.8	Definition of Cordage, etc.
270	Max.	1/8	Right and left laid rope
280-290	Ave.	4/5.5	"Small stuff"
300-310	Max.	1/8	No. of thread x no. of strand = no. of the line
320-380	Ave.	6.7/2.9	Film on of uses of rope
390-410	Min.	9.1/2.6	Continue film
420-540	Ave.	3.9/4.2	Demonstration of sisal, hemp, flax, etc.
550-570	Max.	4.3/8	Rope is measured in fathoms
580	Ave.	2/7	How fathom was derived
590	Max.	3/8	Fathom = 6'
600-610	Ave.	5/4	Measure rope by circumference
620	Max.	1/8	Continued
630	Ave.	4/6	Title cards with rules for handling line
640-680	Max.	1.8/9	Continued
690	Ave.	5/7	Inspect lines
700-710	Min.	9/2	Treat standing rigging, Intro. to wire rope
720-770	Ave.	3.3/4.3	Wire rope
780	Min.	8/1	Splicing
790-900	Ave.	2.7/2.2	Make up of wire rope, galvanize, etc.
910	Max.	1/8	Difference between 6 x 24 and 6 x 12
920-940	Ave.	2.3/2.3	Measure size across diameter
950-960	Min.	8/0.5	Introduction to use of wire rope
970-1060	Ave.	5.5/2.3	Film on use of wire rope; slides on maintenance of wire rope
1070-1080	Min.	8.5/1.5	Introduction of Coast Guardsman
1090-1170	Ave.	3.4/3.3	How to uncoil a rope, to treat ends of rope
1180	Min.	8/2	Continue talk on treatment of end
1190-1320	Ave.	3.6/3.7	Continued demonstration
1330-1340	Max.	0/8.5	Demonstration of faked down coil
1350-1420	Ave.	4.1/3.1	Faked down unevenly
1430-1490	Min.	12.3/0.3	Saying "good-bye" to Coast Guardsman and repeat film. Uncoiling wire rope
1500-1520	Ave.	3.6/5.6	Review
1530-1560	Max.	3.3/8.6	Review of how to measure film and wire rope
1570-1600	Ave.	4.6/4.3	Review of how not to treat rope
1610-1626	Min.	9/2.5	Lecturer's "sign off"

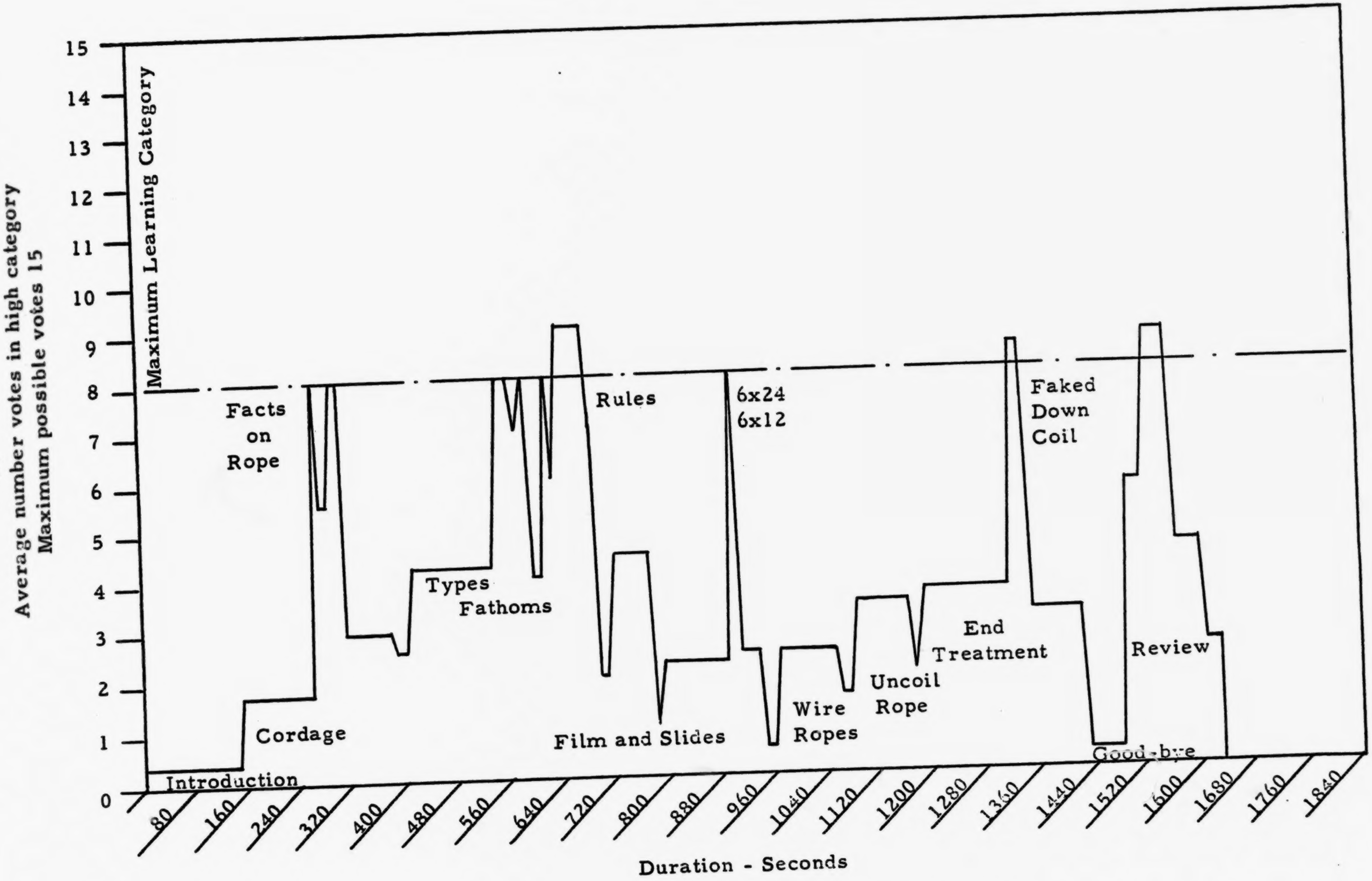

Figure 2 Profile of Kinescope "Manila and Wire Rope"

SUMMARY AND CONCLUSIONS

Fifteen Naval Reserve Officers of the Volunteer Naval Reserve Research Company 4-4 of The Pennsylvania State College took part in a program to determine the value of two kinescopes as training media relative to conventional training films. Employing a rating form now being developed by the Instructional Film Research Program, a panel of 12 of these officers gave each of the two kinescopes a rated score which is above the mean rated score of the conventional films which they have considered.

A further analysis was made to determine the effectiveness of each part of the film in communicating information. With the use of the Film Analyzer it was determined that most of the two kinescopes were effective in this respect.

It may be concluded from this investigation, within the limitations of the methods used, that the two kinescopes under consideration were at least as effective in the communication of information as the average of the training films that have been studied by the Instructional Film Research Program.

APPENDIX

Film Analysis Form C

Note: This form is not ready for practical field use as it now stands. It is currently being revised, and it is expected that a number of the questions will be modified or deleted.

Instructional Film Research Program

Film Analysis Form C

Title of film: **Total Score**__________

Evaluator: **Date:**

In what capacity do you believe you are best qualified to assess this film? (Place a check beside one of the following alternatives. If qualified in more than one respect, number your choices to indicate the relative order or qualification.)

_____ As a subject matter expert.

_____ As an expert in instructional film techniques.

_____ As an instructor or potential user of the film.

_____ As a student or potential member of the target audience.

INSTRUCTIONS

This form has been designed to help you to be objective in estimating the instructional value of the film you have just seen. Please read each item carefully and be as objective as possible in making your rating. The six numbers following each criterion represent a scale or continuum. The extremes of each scale have been identified to aid you in making this choice. Circle the number which represents your best judgment of the degree to which the film satisfies each criterion.

There may be some items on which you may not feel qualified to make a judgment. Please indicate on the scale to the left of each item how well qualified you feel you are to make a judgment about that item. On this scale the numbers have the following meanings:

0 - I do not feel qualified to make a judgment concerning this characteristic of the film.

1 - I feel reasonably well qualified to make such a judgment.

2 - I feel very well qualified to make such a judgment.

PLEASE DO NOT OMIT ANY ITEMS - RATE THE FILM ON EACH CHARACTERISTIC.

0-1-2 1. Are the objectives of the film stated or made explicit?

Objectives are very ambiguous	Objectives are very clear

1 2 3 4 5 6

0-1-2 2. Is the identity of the target audience made clear?

Target audience is very poorly defined	Target audience is very clearly defined

1 2 3 4 5 6

0-1-2 3. Is the film designed for a target audience with a relatively narrow range of abilities? (e.g., a specific age group, educational level, or stage in training?

Designed for broad heterogeneous group	Designed for specific homogeneous group

1 2 3 4 5 6

0-1-2 4. Does the content relate directly to the main objectives of the film?

Unrelated	Clearly related

1 2 3 4 5 6

0-1-2 5. Is the difficulty of the subject matter appropriate considering the characteristics of the target audience? (e.g., age, educational level, intelligence, etc.)

Very inappropriate: either too difficult or too easy	Very appropriate: neither too difficult nor too easy

1 2 3 4 5 6

0-1-2 6. Is the treatment (story form, exposition, animation, live action, etc.) appropriate to the subject matter?

Treatment is very inappropriate	Treatment is very appropriate

1 2 3 4 5 6

0-1-2 7. Are new ideas, concepts, or procedures introduced at a *rate* which will permit or facilitate learning by the target audience?

Poor rate of development: either too fast or too slow	Effective rate of development: neither too fast nor too slow

1 2 3 4 5 6

0-1-2 8. Is the information presented *technically* accurate?

Contains many errors	Contains no errors

1 2 3 4 5 6

0-1-2 9. What is the relative importance of the inaccuracies in the film? (If there are no inaccuracies noted, they are logically of little or no importance.)

Of crucial importance	Of little or no importance

1 2 3 4 5 6

0-1-2 10. Would the target audience get an *impression* of accuracy?

The film gives an impression of falseness	The film gives an impression of absolute correctness

1 2 3 4 5 6

0-1-2 11. Is the content of the film up-to-date?

Entirely out-of-date	Entirely up-to-date

1 2 3 4 5 6

0-1-2 **12.** **Is the material or task shown as the individual would perceive it in a life situation or during an actual performance?**

Never shows material from trainee's point of view	Always shows material from trainee's point of view

1 2 3 4 5 6

0-1-2 **13.** **Does the film relate to and utilize previous knowledge, skills, and experiences of the target audience?**

No relation to and use of previous knowledge and training	Integrates film content and previous experience very effectively

1 2 3 4 5 6

0-1-2 **14.** **Is the treatment made as personal as possible? (i.e., does it produce maximum "involvement" of the viewer in the film situation?)**

The treatment is completely divorced from the individual viewer	The treatment is highly personalized

1 2 3 4 5 6

0-1-2 **15.** **Does the film provide for adequate repetition of the important content? (e.g., repetition with variation, exact repetition, summaries, outlines, etc.)**

Repetition is never used or is used excessively	Repetition is used effectively where appropriate

1 2 3 4 5 6

0-1-2 **16.** Does the kind of film employed (color or black and white) effectively show the essential details of the subject matter? (i.e., are crucial learning cues clearly emphasized by the type of film used?)

a. If the film is in black and white, rate on this scale:

Black and white is ineffective; color would be much more appropriate	Black and white is appropriate; shows crucial learning cues very clearly

1 2 3 4 5 6

b. If this film is in color, rate on this scale:

Color is unnecessary; black and white would be equally effective	Color is used to good advantage; shows crucial learning cues very clearly

1 2 3 4 5 6

0-1-2 **17.** Are sound effects perceived as authentic and realistic?

Very artificial	Very realistic

1 2 3 4 5 6

0-1-2 **18.** Does the film effectively employ the potential characteristics of the motion picture? (e.g., does it take full advantage of its potential to portray motion?)

Motion is used ineffectively or not at all	Motion is used very effectively

1 2 3 4 5 6

0-1-2 **19.** Are the details of the information or demonstration clearly emphasized by the commentary?

Commentary is very obscure or confusing	Commentary is very clear

1 2 3 4 5 6

0-1-2 20. Is the verbal difficulty of the commentary appropriate to the age and educational level of the target audience?

Very inappropriate: either too difficult or too easy	Very appropriate: neither too difficult nor too easy

1 2 3 4 5 6

0-1-2 21. Is new terminology introduced at an appropriate rate?

Introduced much too rapidly or much too slowly	Introduced at a very effective rate

1 2 3 4 5 6

0-1-2 22. Is new terminology given adequate explanation and repetition?

Very inadequate	Very adequate

1 2 3 4 5 6

0-1-2 23. Does the film employ techniques to motivate the viewer to learn the material? (e.g., inserted questions, audience participation, relating of content to viewer by showing implications and usefulness.)

Film supplies no motivation	Film provides strong motivation

1 2 3 4 5 6

0-1-2 24. Did the film attract and hold your interest?

Found it dull and boring	Found it very interesting

1 2 3 4 5 6

0-1-2 25. Will the film attract and hold the interest of the target audience?

Will find it dull and boring	Will find it very interesting

1 2 3 4 5 6

0-1-2 26. Is the difficulty of the pictorial presentation appropriate considering the characteristics of the target audience? (e.g., age, educational level, intelligence, etc.)

Very inappropriate:
either too difficult
or too easy

Very appropriate:
neither too difficult
nor too easy

1 2 3 4 5 6

0-1-2 27. Is the information presented pictorially well integrated with that presented in the commentary?

There is little or
no integration

Commentary and
picture are closely
integrated

1 2 3 4 5 6

0-1-2 28. Is the content presented in an organized, systematic pattern?

Confused and
disorganized

Very well
organized

1 2 3 4 5 6

0-1-2 29. Does this organization of the content contribute to the film's effectiveness?

Greatly impedes learning

Greatly facilitates learning

1 2 3 4 5 6

0-1-2 30. Is the film content specific, i.e., does the film deal with precise factual material rather than broad abstract generalizations?

Very general

Very specific

1 2 3 4 5 6

0-1-2 31. Are the important ideas or procedures clearly emphasized?

Main points are
very vague

Principal points
stand out clearly

1 2 3 4 5 6

0-1-2 **32. Does the pictorial presentation give an impression of realism?**

Very artificial	**Very realistic**

1 2 3 4 5 6

0-1-2 **33. Is there a strong likelihood that the content of the film will be consistent and compatible with the previous experience or knowledge of the target audience?**

Very inconsistent	**Highly consistent**

1 2 3 4 5 6

0-1-2 **34. Is it highly probable that the information or procedures presented in the film will be confirmed by subsequent experience?**

No confirmation is possible	**Definite confirmation is likely**

1 2 3 4 5 6

0-1-2 **35. Is it highly probable that the target audience will be able to use or apply the information or procedures presented by the film?**

None of the content is likely to be useful	**All of the content is likely to be useful**

1 2 3 4 5 6

0-1-2 **36. Are the details of the information or demonstration clearly presented pictorially? (Camera angles, lighting, time on screen, etc.)**

Presentation is obscure or confusing	**Presentation is very clear**

1 2 3 4 5 6

0-1-2 **37. Does the film clearly show common errors which might be made by the target audience and how such errors could be avoided?**

Does not show possible errors	**Points out all errors and shows how to avoid them**

1 2 3 4 5 6

0-1-2 38. Is the length of the film adequate considering the number and difficulty of the ideas, concepts, or skills to be taught?

The film is either too short or too long	**The length of the film is just right**

1 2 3 4 5 6

0-1-2 39. Could the subject matter be treated more effectively through some other medium? (e.g., lecture, demonstration, slide film, textbook, television)

A motion picture is much less effective than other means of presenting the subject matter	**A motion picture is much more effective than other means of presenting the subject matter**

1 2 3 4 5 6

0-1-2 40. Could the subject matter be taught as effectively but more feasibly or economically by some other means?

A motion picture is the least feasible means of presenting the subject matter	**A motion picture is the most feasible form of presenting the subject matter**

1 2 3 4 5 6

0-1-2 41. Did you like this film?

Not at all	**Very much**

1 2 3 4 5 6

0-1-2 42. What would you estimate the effectiveness of this film to be?

a. If the film is of an information type, what percentage of the total information contained in the film would be learned by the target audience from a single showing? _______%

b. If the film is of a perceptual-motor type, what percentage of the target audience would be able to perform the task after a single showing? _______%

SURVEY OF TELEVISION UTILIZATION
IN ARMY TRAINING

Human Engineering Report SpecDevCen 530-01-1

Under Contract #530(01)
With Iowa State College
Ames, Iowa

Report prepared by:
Martin F. Fritz
Chief Investigator
James E. Humphrey
J. A. Greenlee
Ralph L. Madison

31 December 1952
Final Report

Approved:

Army Participation Group	For the Special Devices Center
L. W. Adams	T. B. Haley
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Associate Director (Army)	Commanding Officer and Director

Office of Naval Research
SPECIAL DEVICES CENTER
Human Engineering Division

INTRODUCTION: - Experience in commercial and instructional television, while offering great promise of military training application, has provided only partial answers to the practical questions involved in using television in military training.

PURPOSE: - The purpose of this study project, then, is to interpret previous findings and experience in terms of direct application to Army training problems, and to fill in, when necessary, gaps in the available information. The basic question, can television be advantageously integrated with Army training programs, was broken down for study purposes into the following specific questions:

1. How can Army subject matters be systematically evaluated with respect to suitability for television treatment?

2. Is available commercial television equipment suitable to meet training objectives?

3. What are the uses of training aids in television?

4. Does television have characteristics which improve learning?

5. What operational techniques find their place in training by television?

6. What special problems, if any, arise in selecting and training television instructors?

RESULTS: - The results are keyed directly to these questions and show that the use of television as a training medium is feasible in the attainment of Army training objectives.

RECOMMENDATION: - It is recommended that the Army initiate a limited television training program based on the findings of this report, in order to supplement experience and research results with actual field trial.

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SURVEY OF TELEVISION UTILIZATION
IN
ARMY TRAINING

GENERAL CONCLUSION

Television can be advantageously integrated into the Army training program.

It is further concluded that:

1. Objective selection of Army subjects suitable for television can be made by a committee of officers intimately familiar with the training schedule using a criteria check-list developed specifically for the purpose.

2. Military training can be achieved with commercially available television equipment.

3. Training aids designed for demonstrational purposes are universally applicable to television.

4. The psychological advantages of magnification and close-up views make television teaching especially valuable.

5. Economy can be effected through the use of operational equipment which will reduce the requirement for specially constructed training aids.

6. One camera will fulfill most military training needs, but for reliability and flexibility in use, two cameras are more desirable.

7. Kinescope recordings are most useful in training instructors, duplicating lessons, and disseminating new developments rapidly.

8. Qualified instructors can be trained to teach by television.

9. Television teacher training can be accomplished in a relatively short time when instructors have had the usual preparation for teaching and actual classroom experience.

SURVEY OF TELEVISION UTILIZATION
IN
ARMY TRAINING

GENERAL RECOMMENDATION

that television be used in Army training

It is further recommended that:

Training by television be introduced into a military establishment conducting mass training in order to provide procedural patterns in the utilization of television as a training medium:

A - FIRST PRIORITY to yield an indication as to whether television can result in an economy of time, money or personnel by

1. effective utilization of television in present training schedule, including the
    - a. evaluation of learning
    - b. development of television production methods most useful for training
    - c. determination of skills television instructors should have and the best way to develop them in present training personnel
2. analysis of costs incident to incorporation of television in the present training schedule

B - SECOND PRIORITY to yield a validated curriculum primarily designed for television utilization in training by

1. effective utilization of television in a modified training schedule designed to maximize television instruction

2. determination of the optimum use of kinescope recordings and motion picture films

SUMMARY

Purpose

The development of television as a medium for education early indicated the possibility of its use in military training. Whether such use could apply to mass training, mainly technical, of large bodies of troops needed to be determined by a survey of existing television potentialities.

Abstract

A review of the literature (from which a selected bibliography was compiled) indicates that both military and civilian agencies have experimented--on the whole, successfully--with the medium. Experimentation has increased greatly within the last year or two and is accelerating but these efforts remain exploratory for the most part.

The first problem of this survey was to devise a method for determining what military subjects were best suited for televising. No self-administering method could be found. Each subject of the hundreds existing in Army curricula had to be evaluated on its own merits. Nevertheless, a check-list containing favorable and unfavorable criteria was evolved against which the individual subject could be measured and which would provide a rapid and complete test. This check-list was used most effectively by a panel of three officers thoroughly familiar with the training schedule from which subjects were under consideration for televising.

The survey next undertook a study of the existing use of television in Army's active training. Observation at the Signal School, Fort Monmouth, N. J., revealed that television had been integrated into the curricula and that special problems arising from the use of television as an educational medium were being solved, its advantages exploited. Such facts as that no more than twenty students should view one receiver screen, not more than thirty minutes should be the length of one viewing, four the number of hours of television instruction per day, that instruction should be informal and instructor-dominated were determined. The extent to which an instructor not used to television could adjust to that medium and how quickly, and the kind of instruction that could be televised were being ascertained. Further observation at the Chaplain School, Aberdeen Proving Ground, and WOI-TV elicited additional information such as the possibility that attitudinal programs could be televised as well as technical ones and by the same means, that tactical demonstrations in the field were suitable for televising and also any demonstration that included the use of visual aids.

Because of the importance of training aids in Army instruction, special attention was given to their use on television. Experimentation revealed that fine-line charts were most effective in black and white, other charts in gray on brown. Careful study was made of flannelgraphs, magnetic boards, sectional flip-cards, models, mock-ups, cutaways, training boards and similar devices before they were approved as "standard equipment".

The suitability of existing television equipment for Army training purposes was studied and included that of both studio and classroom. In the studio, lapel microphones, monitors, flat lighting, tripod dollies, card stands and holders, equipment for showing films, film strips, and kinescopes, and a closed circuit system were considered mandatory; equipment for making kinescope recordings and microwave transmitters were considered optional. A two camera chain was to be considered standard; however, successful teaching by television was achieved with only one camera. In the classroom, no special lighting was considered necessary, nor the use of a special large-screen projector.

Some of the more important mechanical characteristics of television affording easier learning received particularly careful attention. Superimpositions, fades, dissolves, over-the-shoulder shots, close-up shots, and pannings were studied with results considered to be highly favorable although some need to be used with restraint. How the mechanics of television affected such simple matters as the use of the blackboard and the paraphernalia of a setting also proved significant: the blackboard writer must move slowly, limit and condense the amount of his writing to avoid distraction to his viewers; paraphernalia of the setting needs to be kept to a minimum for the same reason.

The instructor, removed from his familiar classroom situation and placed in front of the camera, presented a problem. His movements, especially, were a serious consideration, for his actions in a classroom might not be suited to photography. In the studio he must walk about slowly and only as far as the camera can follow him, he must write on the blackboard, use a pointer, display objects, and move his body or arms so that no distraction occurs. He must learn to look properly at the camer-eye so that he does not appear to be either "mugging" or ignoring it altogether. He must speak deliverately to insure proper enunciation. Until he learns these rudiments, initial supervision by a more experienced instructor, use of audio and kinescope recordings, practice with the studio monitor and self-evaluation are required. He should be given "dry runs" at first and the initial transition from classroom to studio should be accomplished with the familiar situation of having "someone to talk to".

Kinescope recordings were examined with especial care, not only because of their importance in instructor training but because they are to television what the tape recording is to radio. They possess all the advantages of tape recordings: they are authentic records, they can be studied leisurely for various purposes, allow duplication of programs, and the like.

Method and Scope

The survey was accomplished mainly by observation of existing procedures at Army television stations and at the educational station, WOI-TV, Iowa State College, Ames, Iowa. Valuable information gained by Special Devices Center through experimentation was drawn upon. Television engineers, technicians, and those experienced in TV production were freely consulted. Television literature was also examined, particularly for corroboration of facts and information that had been obtained at first-hand. A criteria checklist was devised to determine what Army subjects could be televised and validation thereof accomplished. Statistical analyses were made of data available at the Signal School, Fort Monmouth.

As wide a view as possible was obtained by visits to military installations in the East and Mid-West.

SURVEY OF TELEVISION UTILIZATION
IN
ARMY TRAINING

PART I

TELEVISION AS A MEDIUM FOR EDUCATION

A. In Civil Life

Television has been used as medium for education in the United States for at least fifteen years. The first educational television program was presented on May 19, 1938, to 250 students of the New York University School of Commerce. The program lasted forty-five minutes, was carried over twenty-five sets in the RCA building, New York, New York; there were two or more students and an instructor on every screen, and a two-way radio system permitted intercommunication.[1] Similar programs followed until by 1950 at least forty-five colleges and universities were offering, or preparing to offer, like instruction.[2] As an example of one of the more recent efforts in the field, The University of Omaha offers (1952) a six-weeks' course in the humanities, carrying two hours of college credit, as a part of the institution's course of instruction.[3]

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[1] Clark, C. C. "Television in Education." School and Society, Oct. 1, 1938, V. 48, pp. 431-2.

[2] "Colleges and Universities Prepare Television Programs." School and Society, Sept. 2, 1950, V. 72, p. 155.

[3] Cotton, Paul. "Actual College Credits in New TV 'Classroom." Des Moines Sunday Register, June 15, 1952, TV Supplement.

Public schools, both elementary and high, have kept pace with this development. The Philadelphia, Pennsylvania, school system by 1948 had already tried television extensively.[1] By 1952, the two largest cities of the world, London and New York, were deeply engaged. Six London schools experimentally taught biology with the object of including television instruction in schools all over Britain if the initial attempts were successful.[2] New York had gone so far as to attempt bringing the classroom into the home so that parents could see exactly what their children were receiving by way of education.[3]

Outside the educational institutions, business, government and the television stations themselves have been advancing adult education in one form or another. Commercial sponsors have adapted face-to-face selling techniques to television requirements to acquaint customers with the value of products.[4] A department store presented information about its goods on twenty sets distributed throughout the store.[5] Women throughout the entire country have been taught how to make a dress by means of television.[1] The National Broadcasting Company, in cooperation with the New York City Board of Education, began a series of instructional studies on April 7, 1946, known as "Your World Tomorrow." This series presents atomic jet propulsion, radio detection and laboratory demonstrations, with drama for historical background and field "pick-ups" for special events.

---

[1] Gable, Martha A. School Management, Dec., 1948.

[2] "Britain Begins Teaching by TV." Des Moines Daily Register and Tribune, May 6, 1952.

[3] Shayon, Robert L. "Inside Our Schools Via Television." Saturday Review of Literature, April 19, 1952, p. 48.

[4] Armstrong, Terry. "Seven Ways TV Commercials Are Asking Folks to Buy." Sales Management, Sept. 15, 1949.

[5] Dallaire, Victor J. "Intra-Store TV and the National Advertiser." Gimbels, Philadelphia, Pa.

B. In the Armed Services

As early as 1942 television was used to train service personnel such as air raid wardens.[2] The Special Devices Center has carried on extensive experimentation---so extensive, in fact, that the list of projects is not mentioned here but confined to the bibliography appended to this report. Organizations within the Armed Forces have conducted and are conducting local investigations with television. Experimentation and investigation, begun with reserve components, has now been extended to active components.

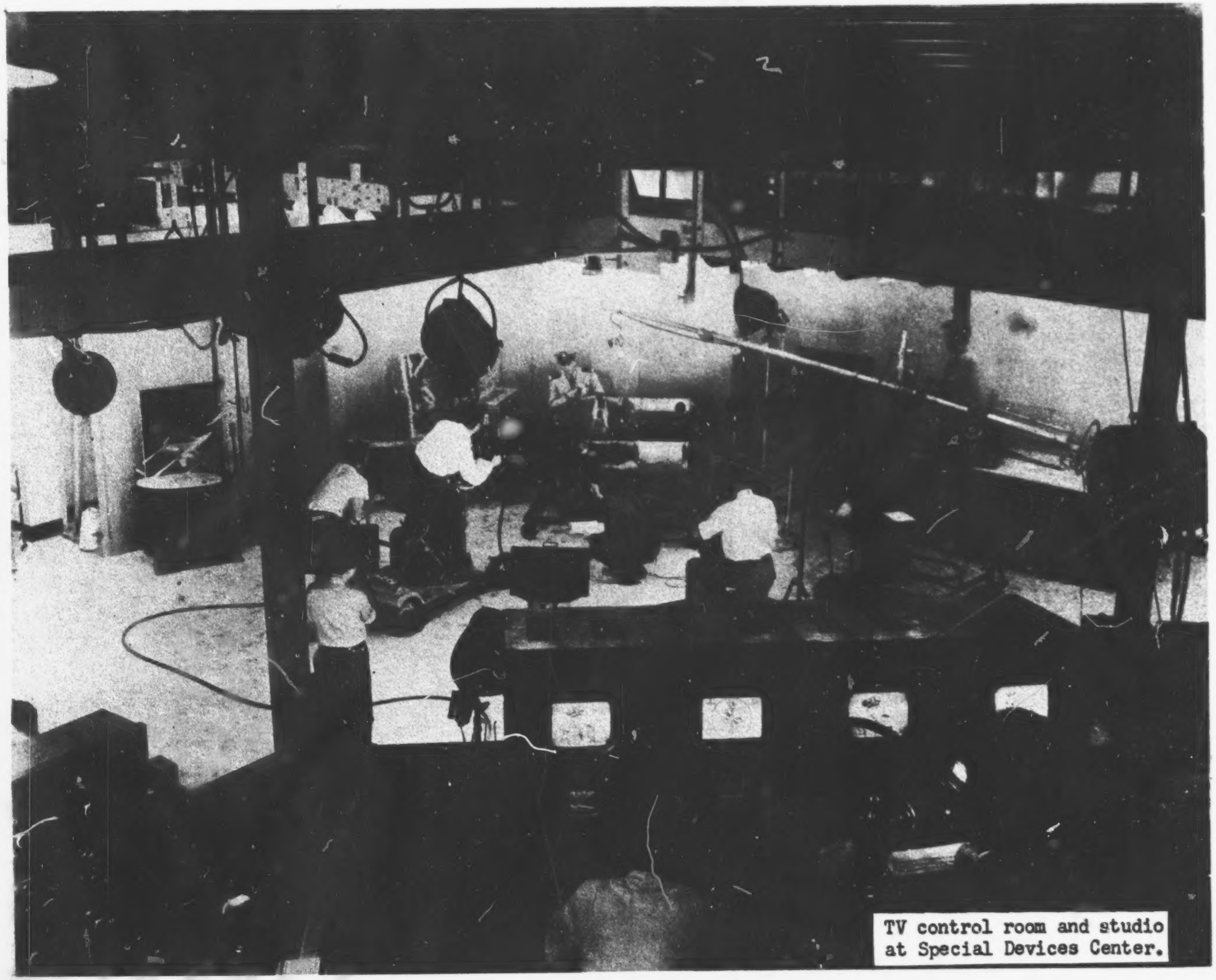
C. Applicability to Active Duty Training

All this television experimentation over the last fifteen years in schools and colleges, by means of "universities of the air", through the dissemination of information by advertisers, the government and

---

[1] Wilson, M. C. and Moe, Edward O. "Effectiveness of Television in Teaching Sewing Practices." Extension Service Circular No. 466, June, 1951. United States Department of Agriculture, Washington, D.C.

[2] Lescarboura, A. "Television Trains the Home Guard." Popular Mechanics, July, 1942, V. 78, pp. 28-31.



TV control room and studio
at Special Devices Center.

television stations, as well as by the armed services themselves, indicates that a definite place exists for television as a medium for military instruction.

Special attention is called to the study[1] concerned with the teaching of Naval Air Reservists by television from which it was concluded that in 80% of all comparisons, television was as good or better than local classroom instruction. Kinescope recordings (films of TV programs) were also found to be effective. The reservists liked the television lessons and were attentive and interested.

In another study[2] with Army Field Force Reservists it was found that all grades of reservists profited from television instruction, remembered well what they had learned, and liked instruction by television.

The rapid development and wide acceptance of television since the close of World War II make it necessary that this new medium of mass communication be given serious consideration. Should television be made available for Army use, it would be desirable to indicate at once those places where application would be advantageous. It is the purpose of this survey to review current practice and to develop a methodology of evaluation whereby it will be possible to establish both the limitations and applicability of television with respect to Army training. In case of a national emergency, it would be of considerable importance to know where television might be utilized as, for instance, in shortening the period of training. When there is a shortage of demonstrational materials or when there is a shortage of instructors, particularly those with a high degree of specialized skills, it is almost self-evident that television offers a solution. It is not difficult to visualize that on rainy days, great number of men could be reached almost on a personal basis and important instruction carried on with a minimum loss of time.

---

[1] Rock, R. T., Duva, J. S., and Murray, J. E. "Training by Television. The Comparative Effectiveness of Instruction by Television, Television Recordings, and Conventional Classroom Procedures". Special Devices Center, Office of Naval Research, Department of the Navy, Port Washington, L.I., N. Y. SDC Report 476-02-2, NAVEXOS P-850-2. (Not dated)

[2] Rock, R. T., Duva, J. S., and Murray, J. E. "Training by Television. A Study in Learning and Retention". Special Devices Center, Office of Naval Research, Department of the Navy, Port Washington, L.I., N. Y. SDC Report 476-02-3, NAVEXOS P-850-3. (Not dated)

There is a strong tendency to consider television as an entertainment medium, commercially sponsored. This viewpoint fails to recognize its important educational applications. Just as the armed services make great use of moving pictures and radio, it can be expected that television will be added as an educational device. It is therefore highly desirable that those engaged in Army training consider the application of this new medium to specific Army situations.

It is not anticipated that television will replace all other training media. Even the most enthusiastic supporter could hardly argue that there is a complete substitute for doing - actual activity - in the development of skills. However, supplementary aids are known to intensify and improve the learning process and it might well be expected that television with its double appeal to both seeing and hearing, will make a considerable contribution.

PART II

TELEVISION IN ARMY TRAINING

A. Criteria for Selection of Lessons

It is recommended that:

1. An unweighted check-list of criteria as a guide for the selection of lessons by television be used.

   A workable check-list has been devised to reveal characteristics of lessons which make them suitable for teaching by television (see Appendix, Exhibit A). Additional experimentation and observation should be made to meet local needs

2. A committee of three instructors in a local situation (such as a camp, lower-echelon unit, etc.) use the check list.

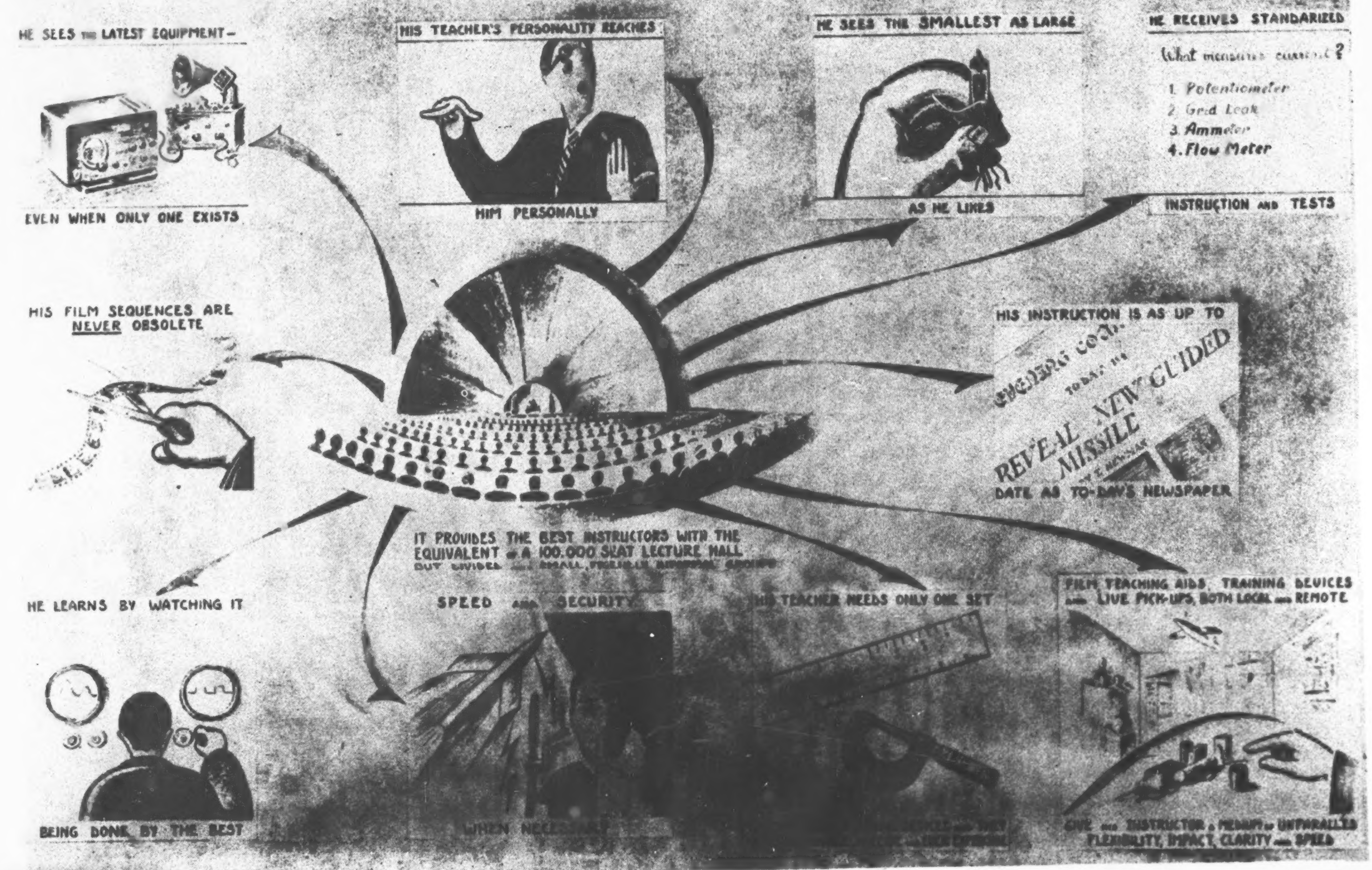
   These instructors must be familiar with the training schedules of the organization concerned; they must know thoroughly the training situation of that organization with all its special problems.

3. Each branch of the service furnish its own general list of criteria (including necessary text materials) to aid the lower echelons.

4. Each training command establish a list of lessons suitable for teaching by television from which a choice may be made quickly for the limited number of hours which can be devoted to teaching by television.

5. The local command conducting the training, and not any higher command, decide what specific subjects shall be televised.

TELEVISION GIVES EVERY STUDENT A FRONT ROW SEAT with the best SERVICE INSTRUCTORS



HE SEES THE LATEST EQUIPMENT—
EVEN WHEN ONLY ONE EXISTS

HIS TEACHER'S PERSONALITY REACHES
HIM PERSONALLY

HE SEES THE SMALLEST AS LARGE
AS HE LIKES

HE RECEIVES STANDARIZED

What measures current?

1. Potentiometer
2. Grid Leak
3. Ammeter
4. Flow Meter

INSTRUCTION AND TESTS

HIS FILM SEQUENCES ARE
NEVER OBSOLETE

HIS INSTRUCTION IS AS UP TO
DATE AS TO-DAY'S NEWSPAPER

IT PROVIDES THE BEST INSTRUCTORS WITH THE
EQUIVALENT OF A 100.000 SEAT LECTURE HALL
BUT DIVIDED [illegible] SMALL, FLEXIBLE [illegible] GROUPS

HE LEARNS BY WATCHING IT
BEING DONE BY THE BEST

SPEED AND SECURITY
WHEN NECESSARY [illegible]

HIS TEACHER NEEDS ONLY ONE SET
[illegible]

FILM TEACHING AIDS, TRAINING DEVICES
AND LIVE PICK-UPS, BOTH LOCAL AND REMOTE
GIVE THE INSTRUCTOR A MEDIUM OF UNPARALLED
FLEXIBILITY, IMPACT, CLARITY AND SPEED

PART II

TELEVISION IN ARMY TRAINING

A. Criteria for Selection of Lessons

1. Types of Criteria

Criteria for the selection of lessons for teaching by television may be divided into two general categories:

(1) those which have an inherent or rational justification and are more or less universally accepted, and

(2) those which will need to be validated by actual experimentation.

Several examples may serve to show the distinction that is being made between so-called Rational criteria and Experimental criteria.

If the supply of instructors were found to be entirely inadequate and if, further, the subject matter were such that new instructors could not be trained in less than perhaps several years time, it is obvious that television could serve a valuable purpose. In fact, were only one qualified instructor available, it would still be possible to present a particular subject to a large number of students in the same intimate manner that is done in the normal class. Again, if the supply of training aids were found to be short, it would be possible to give presentations and demonstrations by means of television because one set of training aids with television equipment would be sufficient. Criteria dealing with such conditions are rational and hardly need experimental justification.

The approach to the selection of criteria based upon experimentation may be illustrated by considering the density of ideas of a lesson. In the absence of experimentation, it would not be known whether the number of ideas per unit of time would be different for television than for other methods of instruction. Again, if it were to be found that models, mock-ups, and actual equipment cannot be presented adequately to students by television, it would then follow that subject matter making use of these training aids is not suitable for television. The development of criteria for such situations will depend upon experimentation and observation.

2. Development of the Criteria Check-List

Thirteen rational criteria with relatively little overlapping were selected. These are described and illustrated in Exhibit A, Appendix. In the initial exploratory work on evaluation of Army training subjects, it became apparent that an instructor was inclined to select or reject lessons largely in terms of his own bias concerning television; those instructors favorably disposed toward television would accept subjects with very little criticism including some materials which might not be appropriate for televising. Those with some little antagonism toward television or greatly favoring the use of films were inclined to reject subject matter that could very well be placed before the television camera. Therefore, in order to minimize the effects of bias a completely new attack was made on the problem. An instructor was not asked whether in his opinion a particular lesson would be suitable for television, but was given a check-list with which to evaluate a lesson and the conditions under which it was taught. No reference was made to television nor was it even necessary for the instructor to know the ultimate objective of the check-list. In other words, an evaluation would be obtained without mentioning television. From the characteristics of the lesson as revealed by the check-list it would then be possible to make a decision as to whether or not television would be applicable but this decision would not be made by the instructor at the time of the evaluation. From the known characteristics of the subject matter, it was then possible to make a decision as to whether or not television would be applicable but this decision would not be made by the evaluator. After try-outs with Reserve Officers in units meeting at the Iowa State College, the form as shown in Exhibit A, Appendix, was finally developed for validation.

Weighted Rating Score: Originally it was thought possible to develop a rating score for each lesson which would represent a television "desirability score" for that particular lesson. Although each individual criterion can be given some sort of value perhaps established by a panel or committee it was clear that such evaluation would be quite arbitrary. At times a single criterion might determine whether or not the lesson would televised. If, for example, security were an important consideration it might well be that a lesson should not be televised regardless of how many other factors may favor the lesson. If a situation is dangerous, television might be extremely useful almost regardless of any other conditions. If color constitutes an indispensable part of a lesson, then television in black and white may have to be abandoned no matter how much it may be desired that the lesson be taught by television.

It seems clear that each lesson will have to be evaluated not only in terms of the total number of criteria which are favorable or unfavorable but also in terms of specific factors which might have special value under certain circumstances. Since no statistically defensible score can be devised which will be valid for all lessons under all circumstances it would seem that a simple count of favorable and unfavorable criteria is the best score that can be assigned to any lesson. This would give a simple "high" or "low" rating and produce a list of subjects from which one might then quickly cull those most favorable or unfavorable for television.

3. How to Use the Criteria Check-List

Take the abbreviated "Check-list for Evaluation of Army Training Subjects" (see next page) and simply mark (1) or (2), whichever applies best to the specific lesson to be evaluated. Complete descriptions of each of the 13 criteria will be found in the Appendix, Exhibit A. These descriptions should be referred to freely until their meaning is thoroughly understood. Very little difficulty will be experiences and evaluations can be made rapidly after about two or three subjects have been evaluated.

The evaluator does not think about television, in fact, he does not even need to know that the ultimate use is teaching by television, but considers each of the 13 items (criteria) according to the descriptions given.

CHECK-LIST FOR
EVALUATION OF ARMY TRAINING SUBJECTS

Lesson ______________________________________ Date ______________
(write in if not already filled)

Make a check mark for every item below according to your information or best judgment.

Think of the lesson in terms of a specific 50 minute period.

1. Type of instruction
   (1) Presentation and/or demonstration... ____ (2) Application...... ____
   (Mostly observation by trainee) (Training by doing)

2. Instructor-student intercommunication (two-way conversation)
   (1) Not necessary........................ ____ (2) Necessary........ ____

3. Rapid dissemination of information (reaching many men early in the training or rapidly distributing new information)
   (1) Necessary (urgent).................. ____ (2) Not urgent....... ____

4. Potential supply of instructors due to difficulty of subject matter (difficult, usually a shortage; easy, many available)
   (1) Few.................................. ____ (2) Many............. ____

5. Physical risks (danger in the training situation)
   (1) Great................................ ____ (2) Little........... ____

6. Supply of training aids
   (1) Short (more needed).................. ____ (2) Sufficient or plentiful........ ____

7. Portability of training aids
   (1) Difficult............................ ____ (2) Easily moved..... ____
   (large, heavy, unwieldy) (light, easily handled)

8. Viewing training aids
   (1) Close-up necessary................... ____ (2) Close-up not necessary........ ____

9. Color used in training aids
   (1) Color essential for teaching......... ____ (2) Not needed, unimportant........ ____

10. Making a sound-film record
    (1) Highly desirable.................... ____ (2) Not desired...... ____

11. Training time lost, moving from area to area
    (1) Much................................ ____ (2) Little........... ____

12. Does weather interfere with instruction?
    (1) Yes................................. ____ (2) No............... ____

13. Security classification?
    (1) Unclassified or restricted.......... ____ (2) Confidential, secret, top secret....... ____

RELATION OF EACH CRITERION TO TELEVISION

+ = applicable, desirable
- = not applicable
0 = optional

Criterion	Evaluation	
	(1)	(2)
1.	+	-
2.	+	-
3.	+	0
4.	+	0
5.	+	0
6.	+	0
7.	+	0
8.	+	0
9.	0	-
10.	+	0
11.	+	0
12.	+	0
13.	+	-

Although no reference is made to television in the Criteria Checklist, thus eliminating attitude toward television as a possible bias, each criterion has a definite relationship to training by television. For example, criterion #4, "Is the number of trained instructors limited by the difficulty of the subject" is plus for (1) because TV would be valuable in case of "few trained instructors available." If, however, there are (2) "many instructors available," there is no strong urgency, so far as this particular factor is concerned, to use television. Its use would be optional.

In general, the greater the number of marks after (1), the greater the adaptability of the lesson to instruction by television. Marks after (2) mean that the lesson either possesses no advantage for television or that presentation by television may even in some cases be contraindicated. It is probable that detrimental effects from use of television will be relatively rare.

The Criteria Check-list is a general guide in early stages of experience with television as an instructional medium. From a list of subjects, those with a high (1) count (favorable for TV) can be quickly selected and considered for television use but the final decision to televise a lesson or not should be made by the local command on the basis of the local situation. Favorable rating of a lesson on the Criteria Check-list is not a mandate to televise but rather indicates feasibility.

4. Trials of the Criteria Check-List

Even though the Rational criteria are accepted, there still remains the problem of finding whether or not actual evaluation can be made of Army training subjects based on these criteria. The earliest checks using officers and enlisted men in the Organized Reserve Corps meeting at Iowa State College, revealed that it was necessary for an instructor to be familiar with the subjects being evaluated in relation to the training situation in his own organization. Differences in evaluations by individuals were found to be due to the fact that the same subject matter was taught somewhat differently by the several individuals.

5

The Criteria Check-List was given a trial in the Officer Candidate Department of Camp Wood, Ft. Monmouth, New Jersey. The variability found here again seemed to be due to the instructor variation in teaching the same subject. Sometimes, for example, a rating might vary due to the fact that one officer felt a need for a greater number of training aids, while another officer might be fairly well satisfied with the amount available.

Ten subjects in Army basic training were evaluated at Fort Dix, New Jersey, by approximately 50 instructors. Here again, great variability was found. Several instructors reported that they themselves do not teach the same subject in strictly the same manner time after time but introduce variations depending upon the ability and background of the trainees in their classes. It was also found that some instructors tended to rate a subject primarily in terms of educational theory. To illustrate: some stated that intercommunication between instructor and student was highly desirable but admitted at the same time that the amount of intercommunication necessary might vary and that even at times all intercommunication could be dispensed with.

Personnel at the Special Devices Center aided in the early evaluation of Army training subjects by applying a check-list of 21 criteria to 84 Army subjects. These 84 subjects did not constitute a cross section of all Army training since this was not required by the nature of the project but were selected in a widely scattered manner so as to give consideration to all types of Army training. A trial run participated in by 8 men at SpecDevCen confirmed what had previously been found, namely, that a suitable evaluation of all Army subjects was not possible when specialized military experience was disregarded. The requirements of television are so highly specific it became evident that evaluation would be possible only for a particular lesson taught at a particular time in some specified Army post, camp, or station. Since no instructor can hope to speak with complete knowledge of all lessons in all branches of the service it would seem desirable that evaluation be made by each branch school for its own organization. Further inspection of the results made it clear that the check-list of 21 criteria could be shortened. Careful consideration reduced this list to 13 items.

5. Committee Evaluation of Subject Matter

The Criteria Check-list was thoroughly discussed with two groups of officers at Ft. Dix, four from the 39th Infantry Regiment and four from the 60th Regiment. The conclusion was reached that it might be well to try to evaluate Army training subjects by means of a committee. This idea was given a trial by a group of three officer instructors in Ordnance at Aberdeen Proving Ground. Here, it was found that subject matter could be rather quickly evaluated and group agreement in terms of the check list quite readily established.

The ten subjects evaluated by individuals at Ft. Dix were considered by a committee of five officers at Camp Funston, Ft. Riley, Kansas. It was found that the committee could evaluate basic subjects readily and difference of opinion could be quickly resolved by means of a little discussion. It was found that after evaluating some three or four subjects the problem of evaluation seemed to be clearly understood by the committee and checking proceeded quickly.

6. Usefulness of Criteria Check-List

A criteria check-list will be most useful at the time that television is first introduced into an Army post, camp or station, before instructors are available who have had first-hand experience with educational television. After information has been gained on the possibilities as well as limitations of television, an instructor should be able to judge quickly and objectively what lessons may be advantageously taught by television.

At Ft. Riley, Kansas, two officers who were thoroughly familiar with the basic Army Training Program attempted to select a number of subjects which they considered suitable for television and also indicated those which they considered not suitable. These officers were not familiar with television and had viewed it but a few times. It became clear that their judgments were based on relatively few criteria and depended mostly on whether or not the subject was concerned with presentation-demonstration or application. They neglected to consider possible criteria such as the supply of instructors, physical risks, the number of training aids available, portability of training aids, color, whether or not a sound film-record would be desirable, time lost due to moving, and security classification.

From this it can be seen that a check list may have considerable value in helping a committee to think of all aspects of subject matter when considering its suitability for television.

PART II

TELEVISION IN ARMY TRAINING

B. Utilization of Television in Army Teaching

It is recommended that:

1. The number of students viewing one television receiver screen be limited to twenty.

2. Television instruction be limited to four hours per day; each continuous viewing session to not more than 30 minutes; and that there be provision in the schedule for intensive discussion daily.

3. Television subjects be taught as an integral part of the curriculum with changes kept to a minimum.

4. Instruction be informal and extemporaneous.

5. The training situation be instructor-dominated.

6. The best available instructor be used for television.

7. A panel of three men be used in the studio if a partial substitute for class discussion is desired.

8. Each local training command decide whether or not to use an intercommunicating system.

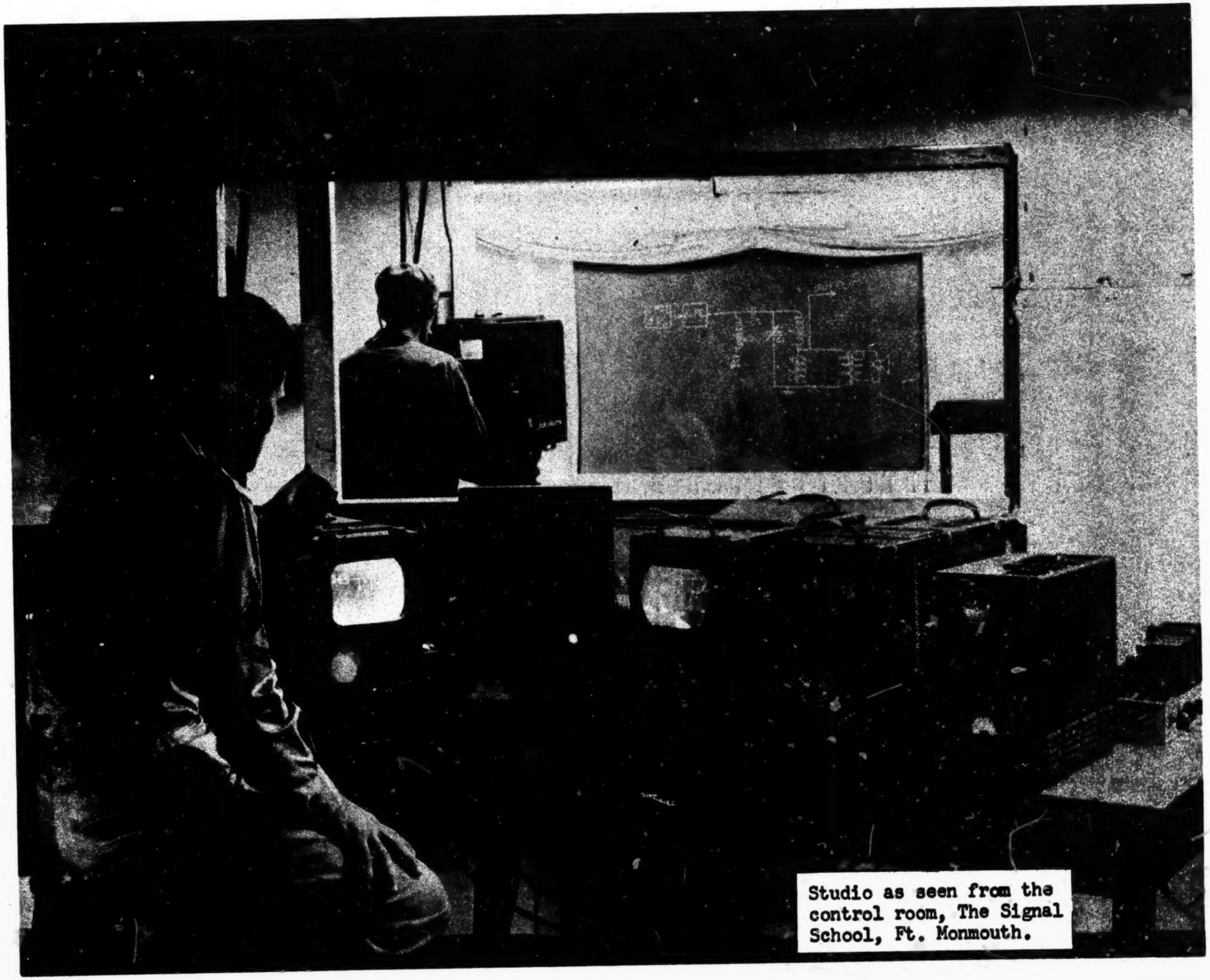
9. There be achievement testing of the type usually employed.

10. Instructors thoroughly familiar with their subject matter and experienced in teaching procedures be selected for television and given some practice "dry runs".

11. Actual demonstrations supported by visual aids be presented on television.

12. Attitudinal subject matter as well as technical be televised.

13. The field use of television be given experimental consideration.



Studio as seen from the control room, The Signal School, Ft. Monmouth.

B. Utilization of Television in Army Teaching

1. In Classrooms

a. Using Technical Subject Matter

(1) Radio Electronics

Facilities at Ft. Monmouth: Since 27 September 1951, telecasting to classes has been carried on in The Signal School, Enlisted Department, Ft. Monmouth, N. J. The physical facilities consist of a control room, a studio, two adjoining classrooms one of which was provided with a 16-inch TV receiver and the other with a 19-inch receiver, and a single camera operated on a closed circuit basis. A second camera on loan from the Special Devices Center has been used since April 1952.

Military Technical personnel at The Signal School installed, maintained, repaired, and modified the equipment and also operated the camera as well as the switcher when two cameras were being used.

Extensive studies were made with enlisted trainees in the course Radio Electronics, Part I, formerly known as Elements of Radio. This course, considered technical in nature, requires a preparational period at Camp Wood or its equivalent. A total of 230 instructional hours are given in 5 weeks. The general subject of Radio Electronics, Part I, is divided into 12 Sections consisting of (1) Introduction to Radio, (2) Circuit Elements and Symbols, (3) Tuned and Coupled

Circuits, (4) Vacuum Tubes, (5) Power Supplies, (6) Vacuum Tube Amplifiers, (7) Vacuum Tube Detectors, (8) Vacuum Tube Oscillators, (9) Radio Transmitters, (10) Radio Receivers, (11) Antennas, Radiation and Wave Propagation, and (12) Examination and Critiques. Instruction is by conference, demonstration, and practical laboratory exercises.

Trainees selected for the electronics course are chosen on the basis of interest in electronics, and a favorable Aptitude Area IX score[1] consisting of (1) Reading and Vocabulary, (2) Arithmetic Reasoning, (3) Electrical Information, and (4) Radio Information. This manner of selection has resulted in a concentration of trainees possessing somewhat better than average ability. Optimum class size is considered to be approximately 20 but the number varies somewhat depending upon the availability of trainees at the time a new class forms. For the period under observation, the non-TV classes were about 30 in size and the TV about 15.

Approximately four class periods per day were devoted to instruction by television. However, the amount of time varied somewhat depending upon the nature of the lessons. Sometimes only a part of a standard 50 minute period was devoted to teaching by television and the remainder to face-to-face instruction. Actually television was adapted to the course of study and no important alterations in scheduling or in subject matter were made. Roughly, then, it can be said that the television classes received close to half of their instruction by television.

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[1] Aptitude Area scores, ten in number, are combinations of scores on the component tests of the Army Classification Battery and provide a basis for initial assignment to Army jobs and school courses.

The instructors, trained civilians, each assigned to a group for the full five weeks, presented their material in an informal manner just as in the regular classroom. Light humor would even be introduced at times for stimulation by calling out the names of trainees as though the instructor were teaching a class face-to-face. The situation was instructor dominated even to the extent of the instructor directing the cameraman. No memorized scripts were used.

Two types of tests were administered to the students in Radio Electronics, Part I: progress tests given during the course and a Comprehensive Test at the end.

Instructors were not held to a rigid schedule but were expected to give from 6 to 9 progress tests. The student's final course mark consisted of the hour quiz grades, the laboratory grade and the Comprehensive score.

The progress tests given at the end of a phase of the course were changed from class to class to discourage cheating. The same Comprehensive Test was used for several classes. Whenever there was evidence of the students' prior knowledge of the test items in the Comprehensive, a change was made.

The Comprehensive Test consisted of 75 multiple choice items with the number of items somewhat in proportion to the amount of time devoted to each particular phase. The test items used in the Comprehensive were submitted by the instructors to a test construction group in the Enlisted Department of The Signal School. In part, the purpose of the test was to determine the difficulty and discrimination of these test items. The scoring of the Comprehensive was by a test and analysis department of The Signal School and not by the instructors.

For the purposes of the statistical analysis[1] only the student's Comprehensive score has been considered since this score provides the greatest number of observations. The population of students from which the sample was drawn had these characteristics in common: (1) they were enlisted men having a recorded minimum Area IX score of 100, (2) they had completed Radio Electronics, Part I, and (3) their scores were available on Comprehensive Test Number Six.

This population has been divided into classes of students in an assumed random manner. The standard and TV classes were formed whenever instructors and a sufficient number of students became available. Every student had an opportunity of being included in a TV Class and only those who felt they might suffer eye strain watching TV were exempted.[2] There were, however, two exceptions to the random selection of classes: one TV class was intentionally selected from students with higher Area IX scores and another, for purposes of comparison, was selected from students with lower Area IX scores.

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[1] Mr. Ralph L. Madison of the Statistical Laboratory, Iowa State College, Ames, Iowa conducted the statistical survey. Other members of the staff, Dr. T. A. Bancroft, Dr. R. J. Jessen, Prof. N. V. Strand, and Dr. E. H. Jebe aided in the planning.

[2] Only two trainees asked to be exempted from television classes.

The sample consisted of all four TV classes tested on Comprehensive Number Six and a random selection of five standard classes tested on Comprehensive Number Six. The Comprehensive scores of 195 students, 61 taught by TV and 134 taught in the standard manner, were recorded for this sample. In addition the Area IX score and certain other informational and aptitude scores were recorded for the individual students where these were available.

The questions the statistical investigation sought to answer were: (1) Is there a significant difference between those classes taught in part by TV and those classes taught in the standard manner? and (2) if a student has high (or low) aptitude and information scores will TV instruction produce a result significantly different from that to be expected from standard instruction?

To answer the first question, the statistical method known technically as analysis of covariance[1] was used on the combined Comprehensive Test Number Six scores and Area IX scores for 195 students.

No statistically significant differences were found between the Comprehensive Test Number Six scores of the television and standard classes after the scores had been adjusted in terms of the Area IX scores. Thus it may be concluded the achievement of students, as measured by Comprehensive Test Number Six scores, taught by television was as good as of those taught in the standard manner.

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[1] When certain factors have not been controlled in an experimental situation, an adjustment may be made by means of Analysis of Covariance. For example, two classes may differ on an examination. It is possible that the students in one class possess greater ability than those in the other and that this might account for the obtained test difference. Although the two classes were not originally matched for ability, we may make an adjustment (Analysis of Covariance) to the same level for both classes if an ability score for each student is available.

The second question was investigated by making comparisons of students paired according to high and low scores on achievement and aptitude tests. Again no statistically significant differences in learning were found to exist between television and standard students.

(2) Wire (Ft. Monmouth)

The Wire Division of the Signal School provides another form of technical instruction.

No long-time, continuous telecasting was carried out in this division as was done in Radio Electronics. However, spot or non-continuous telecasting was resorted to in order to make observations on individual classes. Those classes selected for observation were chosen so that a wide variety of training materials might be tried but no attempt was made to secure a representative sample of the work in the Wire Division. Since the main objective of Project 20-H-2 was concerned with the feasibility of adapting TV to Army training, statistical sampling was not required.

Spot telecasting of individual classes offered the possibility of studying the behavior of instructors who were experienced teachers and familiar with their subject matter but who had never made an appearance before a TV camera. Each instructor was given a few minutes of briefing just before the telecast at which time his attention was called to the studio monitor where he might observe his own actions. He was warned to slow down his movement, not to move rapidly away from or toward the camera and thus create problems in focusing, shown how to move objects about when demonstrating so that the trainee might get a view from various angles, and shown how to trace schematics and diagrams slowly but clearly. He was told to follow the rules of good teaching as he would in a face-to-face class situation.

A qualified instructor familiar with the lesson materials remained in the room with the class where the TV receiver was located while the regular instructor telecast from the studio. For most of the periods, the Chief Instructor, familiar with the telecasting of lessons, was also present to observe the operations.

At the close of the telecasting period, the instructor in the classroom asked the trainees questions on the material in order to determine whether or not the lesson had been effectively presented. Attitudes of trainees were elicited by asking questions such as (1) Did you enjoy this presentation by TV? (2) Did you think it was as effective as it would have been in a regular class situation? (3) Were you able to follow the presentation readily? (4) Were the views of the objects being demonstrated satisfactory to you? (5) Do you think you were able to follow your schematic as well as you would would have been able to in a regular class? (6) Would you like to get a large proportion of your demonstrations by TV?

Answers given by classes to the above questions were favorable to the use of television. Criticisms were, in general, concerned with minor variations in technique and improvements in presentation, but there was no fundamental objection to the applicability of television to the teaching situation. The trainees: (1) enjoyed the television presentation, (2) considered it as effective as a regular class situation and for close-up views better, (3) followed presentations readily, (4) thought that presenting various views of objects was helpful, (5) were able to follow schematics satisfactorily when traced slowly by the instructor and better than in a standard class unless very large diagrams were used in the latter, and (6) thought they would enjoy getting a considerable proportion of their demonstrations by television.

(3) Photo (Ft. Monmouth)

The work in the Photographic Division is comparable to that in Radio Electronics and Wire in the sense that it is technical and therefore the problems in televising the training materials are quite similar. For example, when the demonstration "Head Disassembly of a 16-mm. Motion Picture Camera" was held, the usual television problems were encountered; operating in one plane to avoid bad focus, holding objects so that specific parts are visible, manipulation to various angles so as to show relationships, definitely pointing to specific parts of the device under discussion, and avoiding rapid movements.

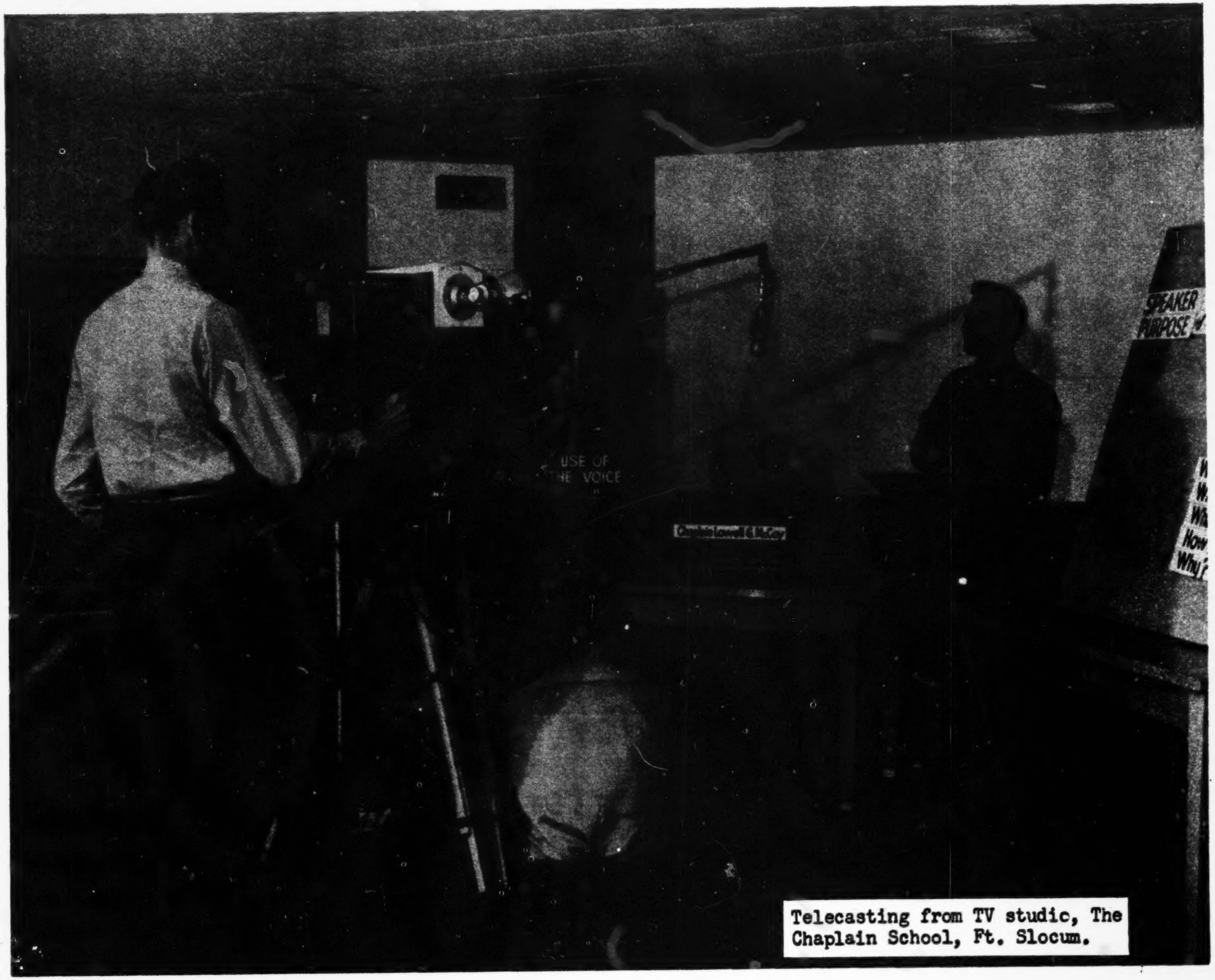
Classes and inexperienced instructors were utilized from the Photographic Division in order to scatter the observations more widely over technical and complex materials. In Photo there are many situations which lend themselves readily to television because of the emphasis on visual presentation. Trainees can be introduced to the general nature of mechanisms, their construction, operation, and maintenance followed by actual experience and the development of manipulative skill.

b. Attitudinal (Intangible) Subject Matter

Instruction may be referred to as "attitudinal" or "intangible" if the subject matter is concerned with certain social and psychological situations. The question arises as to how successfully this kind of subject matter can be handled by television.

(1) Civilian Attitudinal Programs

For some time WOI-TV, the educational television station at Iowa State College, has been successfully telecasting programs of the intangible type. Local polls have shown definite acceptance of programs dealing with reviews of books by a panel, discussions on a wide variety of social problems such as labor, delinquency, and political questions, work carried on by state institutions, lectures on modern history and numbers of others. These are in contrast to programs of a technical nature carried by the same station in the fields of agriculture, engineering, home economics, and science.


SPEAKER
PURPOSE
USE OF
THE VOICE
How
Why?

Telecasting from TV studio, The Chaplain School, Ft. Slocum.

(2) Training at The Chaplain School

Closed circuit television facilities are to be found at Ft. Slocum, The Chaplain School, where subject matter is largely of the "attitudinal," "intangible," or non-mechanical type.

The studio, adjacent to the control room, is large enough to accommodate an entire class so that except for the presence or television cameras a nearly normal teaching situation can be achieved. The lessons presented in the studio are telecast to other classes in nearby rooms.

The students are Army and Air Force chaplains and enlisted men training to become chaplains' assistants.

Selected lessons have been telecast on the subjects of "Use of the Voice," "Citizenship", and "Man is a Moral Being".[1] However, the telecasting of a complete or continuous series of lessons such as the 10-hour course in "use of the Voice" was not attempted but instead individual lessons were selected. Voice and speech techniques are concerned with attitudinal effects because their use in establishing proper rapport, sympathetic understanding, is given consideration.

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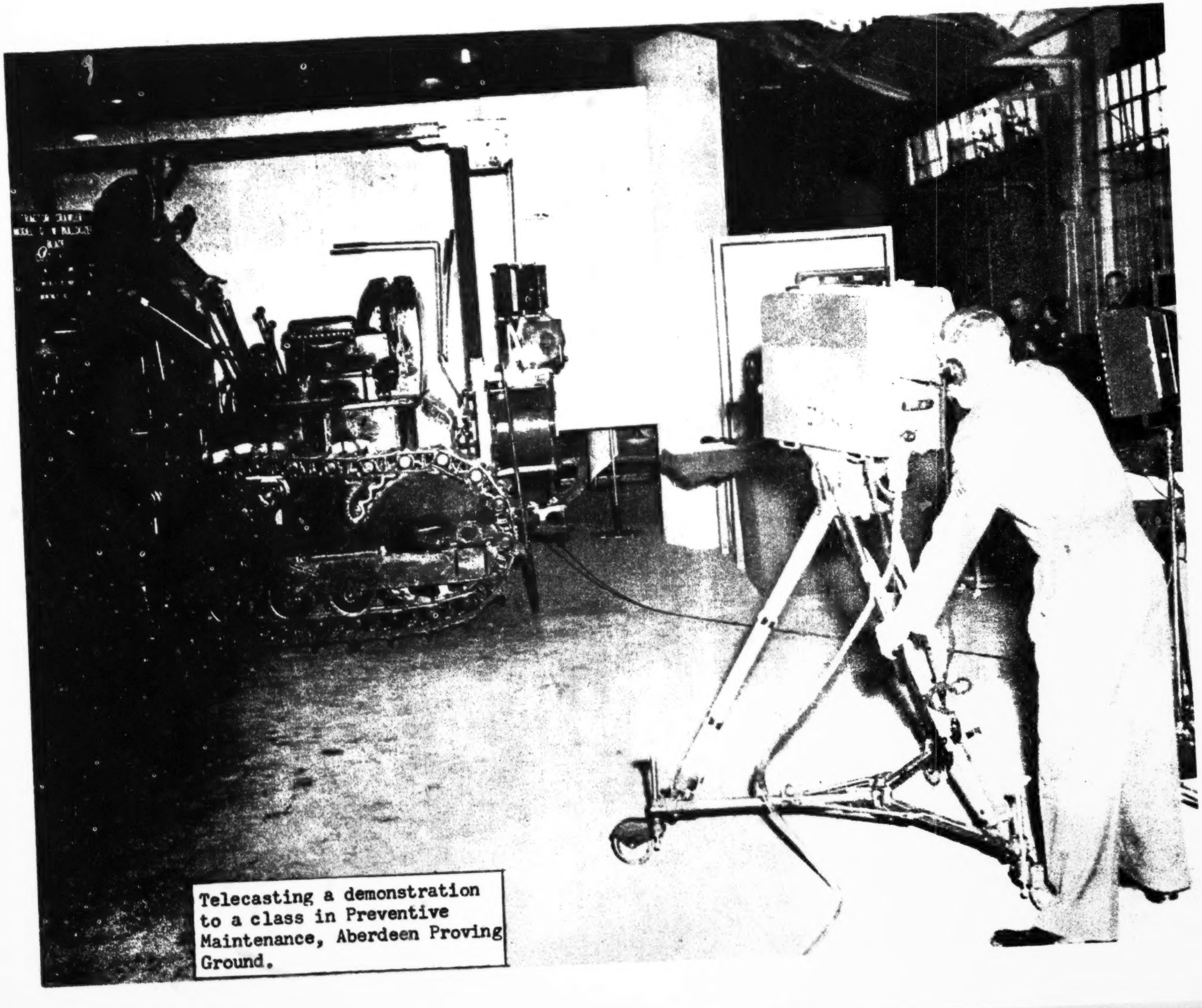
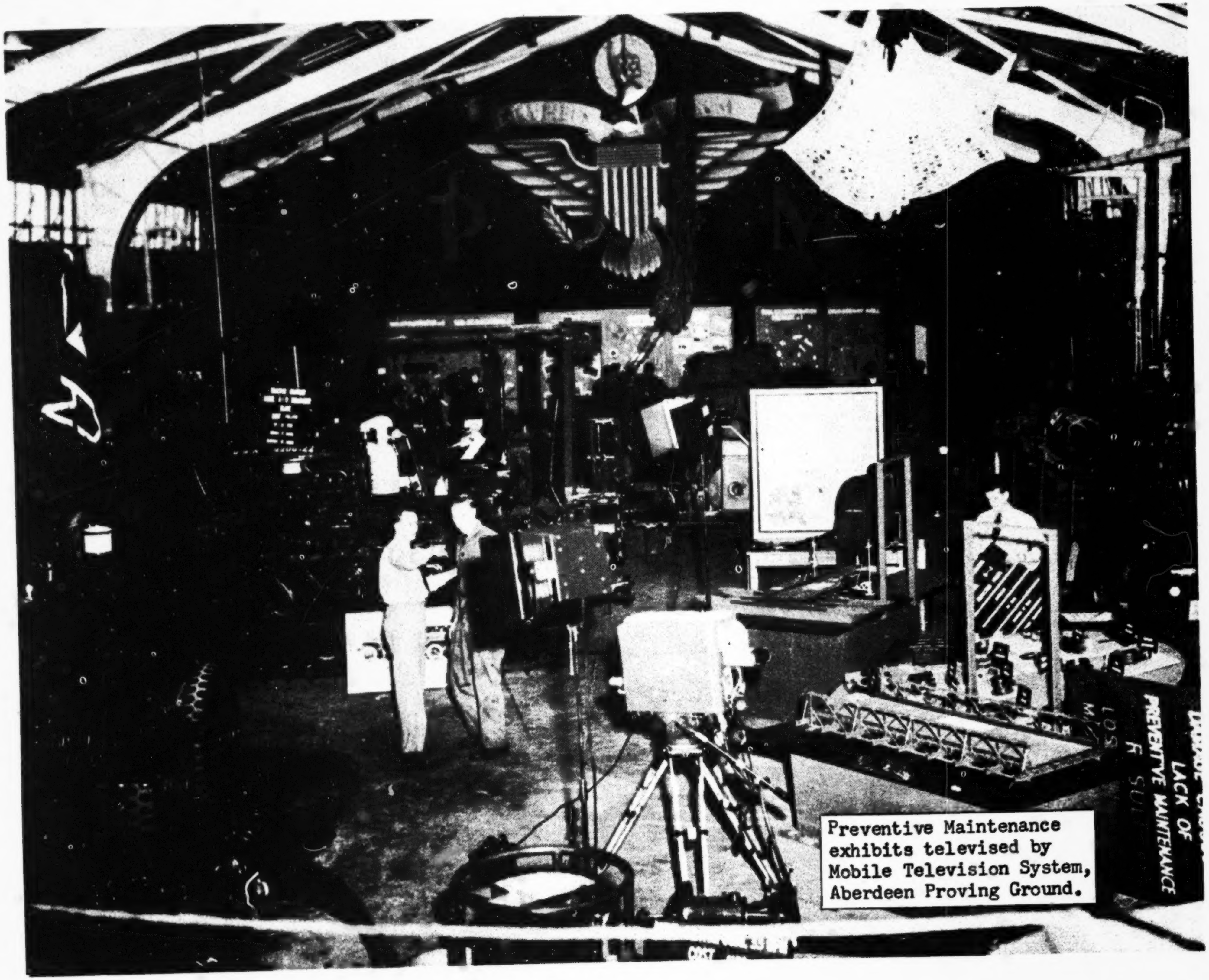
[1] Kinescope recordings of these lessons suitable for projection on 16-mm. sound-on-film projectors are on file at Special Devices Center, Port Washington, L. I., New York.



Telecasting a demonstration
to a class in Preventive
Maintenance, Aberdeen Proving
Ground.


LACK OF
PREVENT'VE MAINTENANCE

Preventive Maintenance
exhibits televised by
Mobile Television System,
Aberdeen Proving Ground.

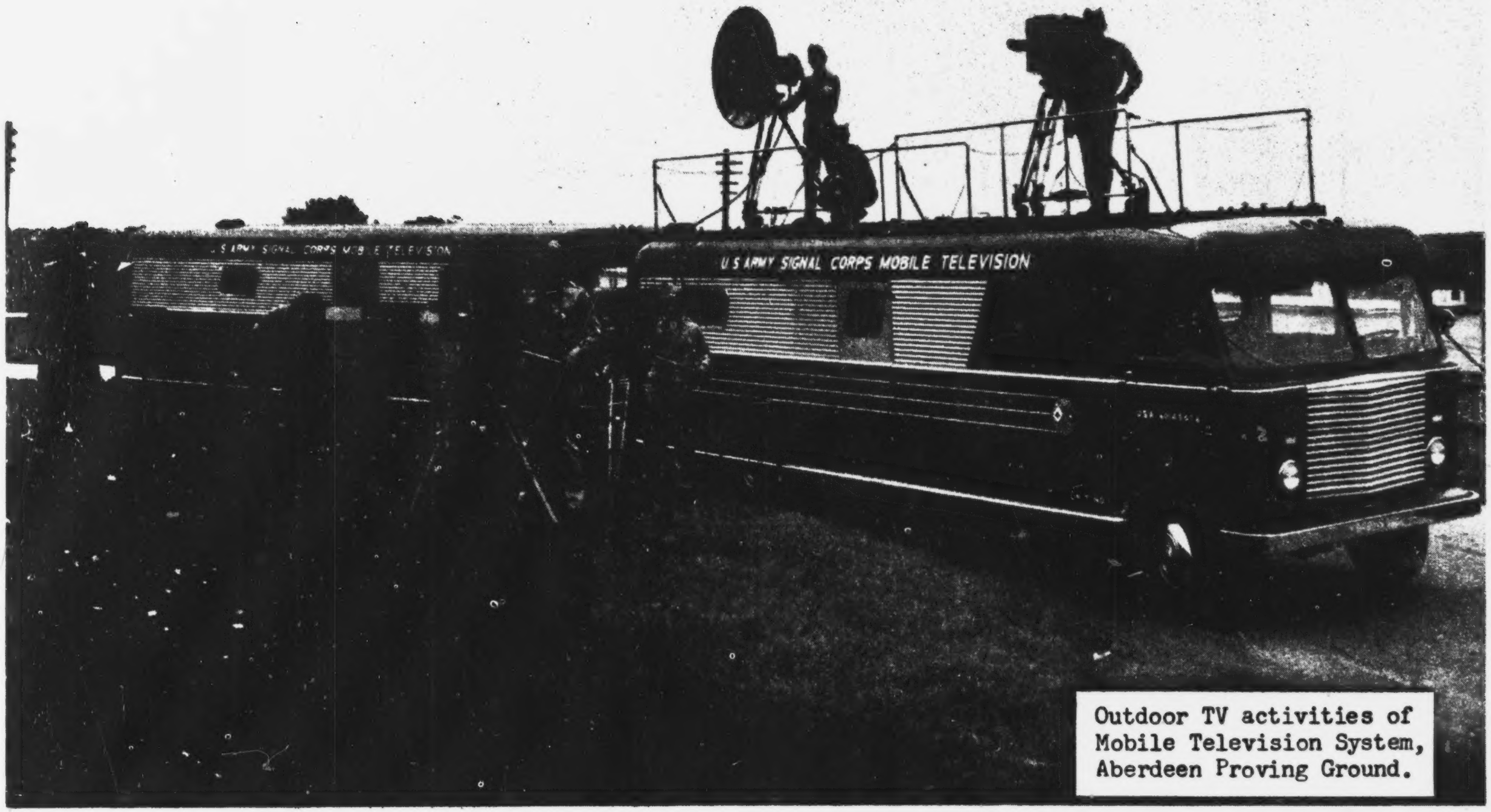
(3) Training in Preventive Maintenance

The Army Field Force Commanders' Preventive Maintenance Course, lasting a week for each group, has been given at Aberdeen Proving Ground for officer personnel drawn from various Army installations throughout the United States. It is not only the purpose of this course to give information concerning problems of maintenance but to develop in these officers an attitude such that preventive maintenance will be given increased attention in their units.

The inculcation of a more favorable attitude has been accomplished in part through the use of Mobile Television System operating at Aberdeen Proving Ground, described in Exhibit B. By means of staged presentations developed by the personnel of Mobile Television System and then telecast to the classes, it has been possible to present the importance of preventive maintenance in a highly dramatic manner.

2. In the Field

In addition to the telecasting of dramatic sketches for the members of the course in Preventive Maintenance at Aberdeen Proving Ground, Mobile Television System has given demonstrations of the tactical use of television. This requires that the television equipment be taken out of the studio and into the field. Under such circumstances micro-wave transmission may be used. This introduces the problem of security because unauthorized persons may also pick up the television signal. Although the tactical use of television has been purely demonstrational


U S ARMY SIGNAL CORPS MOBILE TELEVISION
U S ARMY SIGNAL CORPS MOBILE TELEVISION

Outdoor TV activities of
Mobile Television System,
Aberdeen Proving Ground.

it does suggest use under combat conditions. However, there are technical difficulties still to be solved.

Another example of field use of television was demonstrated by Mobile Television System to show the necessity and importance of preventive maintenance in connection with a diesel locomotive. In this case, it was more convenient, even necessary to take the television camera to the object too unwieldy to be moved to the studio.[1]

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[1] A 16-mm. sound-on-film kinescope recording of this lesson is on deposit at Special Devices Center, Port Washington, L. I., New York.

PART II

TELEVISION IN ARMY TRAINING

C. Training Aids

It is recommended that:

1. Fine-lined schematics of letter size, 8½ x 11, be televised in the usual printing of black on white instead of reverse typography.

2. Large charts be made in contrasting shades of gray; gray on medium brown background if possible.

3. Flannel-graphs, magnetic boards, and sectional flip-cards be used to economize time and to increase trainee attentiveness.

4. Soft, white chalk be used on a blackboard; yellow chalk on a green board given preference when available.

5. Models, mock-ups, cut-aways, and training boards be used but that original equipment be substituted whenever possible because magnification can be produced by television.

6. Attention be given to colors and gray-values; that re-painting be done where shown to be needed by actual try-out.

C. Training Aids

1. General Considerations

Visual training aids should be expected to lend themselves readily to the medium of television. While it is essentially true that "you can televise anything you can look at," this viewpoint is an oversimplification because the characteristics of television equipment as well as the conditions under which television is conducted may impose restrictions. It is also true that television may in certain ways enhance the value of visual training aids and permit instruction not normally possible. While it can be inferred that visual training aids are well adapted to the medium of television, the degree to which this is true will become known only through further actual observation.

The following are some general considerations of training aids which may affect the use of television in army training.

(1) Cost: when training aids are costly, a judgment must frequently be made as to whether or not the educational gains justify the cost of producing a number sufficient for training. With television available, only one training aid without duplication is needed.

(2) Number available: for various reasons, training aids including demonstrational equipment may at times be in short supply. Such shortages are especially likely to occur when new equipment has been adopted or modifications made on the old. However, should only one training aid or one mechanism be available, it would still be possible to give a demonstration to large numbers of trainees by the use of television.

When training aids are not in plentiful supply, distribution to a number of military units using the same aids becomes a serious problem. Complex schedules, difficult to maintain, must be set up to secure integrated distribution. With the use of television, one unit need not always wait until another has finished. Demonstrations can be given to an almost indefinite number of trainees any time that they can be assembled before television receivers, thus, resulting in a more flexible schedule.

(3) Transportability: when training aids are difficult to transport due to the fact that they are heavy and unwieldy, instructors may tend to avoid their use. Television may be a solution to this problem for it is possible either to move the television camera to the training aid or to place the training aid in a central location from which telecasts are to be made.

2. Some Training Aids and Their Physical Characteristics

Because the Army makes considerable use of visual training aids, it was considered desirable to devote some attention to the manner in which they might be used in television.

a. Fine Line Schematics

The question was asked whether a fine line schematic, letter size, 8½ x 11, should be printed in the usual black on white or whether a reversal of this situation, white on black, known as reverse typography, might be more desirable. In order to test this situation schematics used in the Radio Electronics course at Ft. Monmouth were taken to the Special Devices Center for reverse printing and then carefully examined for effectiveness when televised at Ft. Monmouth. It was found that the white lines on a black background had a tendency to expand or "fatten". Opening up or stopping down a lens made no detectable difference and technicians considered that the "burning in" effects were slightly more troublesome with reverse typography. It was agreed by all eight observers participating in this experiment that the reverse prints were less legible than the usual black on white.[1]

b. Gray Charts

An improvement on black and white charts can be made by reproducing them in grays so that the contrast values will be lower. Observations on this situation have been made at the Special Devices Center where charts were prepared using a medium brown background with light gray lines. There is probably no inherent advantage in the brown color but because it photographs as a gray, contrast is reduced. Such charts were found to be very pleasing to observers.

As a general rule, not more than four or five shades of gray should be used to maintain distinctness.[2] If colors are to be used in charts, tests should be made with a television camera to determine whether or not the proper gray values are being obtained.

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[1] Jackson in dealing with coarse lines and large areas, found light figures on dark background to be best. See Jackson, Robert. "Visual Principles for Training by Television." Special Devices Center, Office of Naval Research, Department of the Navy, Port Washington, L. I., N.Y. Human Engineering Report SDC 20-TV-2. (Not dated.) pp. 2, 3, 15, 23.

[2] Recommended by television engineers, WOI-TV, and confirmed by Jackson, p. 16, Op. Cit.

c. Flannel-graph

The flannel-graph is admirably adapted for use before the television camera. It consists of a board over which a flannel cloth, preferably dark gray for television has been stretched. Cards on which words, pictures, and other materials have been printed can be placed in position quickly by simply pressing the cards against the cloth background. They remain in place because of their sandpaper backing or a slightly sticky surface. In this manner, ideas can be quickly presented without the distracting motions of writing on a blackboard. The flannel-graph has been successfully used in television teaching at The Chaplain School.

d. Magnetic Board

The magnetic board is used in much the same manner as a flannel-graph. Small blocks of magnetized metal hold the cards to a board which has a metal facing thus making it possible to place the cards in any position or to move them about at will. This visual device has also been successfully used in television at The Chaplain School.

e. Sectional Flip-Cards

Any part of a chart, diagram, drawing, schematic, or other illustration can be changed rapidly by lifting up or dropping down hinged sections (sectional flip-cards) placed upon a larger card. For example, in a circuit diagram it would be possible to add or subtract symbols such as vacuum tubes, capacitors, or resistors by simply dropping down or lifting up the flip sections which have been superimposed upon a basic circuit diagram.[1] A variation of this technique is sometimes used when a chart or graph is so arranged that pulling a card from the end causes a graph or trend line to develop. This has been used for some time at WOI-TV, Iowa State College, for showing price trends of livestock.

f. Blackboards

White chalk used on a slate blackboard is an acceptable combination for the educational television studio. The widely used portable blackboard, usually a fiber or composition material painted black, is also satisfactory. When a "blackboard" of dark green composition material is used with yellow chalk, a very pleasing effect is obtained because of the low contrast value. This is used in the WOI-TV studio at Iowa State College.

Red, white, blue, green, and yellow chalk were given a trial on a slate blackboard at Ft. Monmouth but the differences among the various colors were not sufficiently great to warrant the selection and recommendation of any one except perhaps white because of its availability. It is possible that certain brands of colored chalk may be pigmented heavily enough or contain pigments of a certain kind so that an advantage may be demonstrated but this problem was not investigated. A soft chalk which will leave a heavy, distinct line is desirable. Sometimes ordinary white chalk is too hard to produce a satisfactory mark especially when used on the non-slate portable blackboards. Special chalk which glows under ultra-violet light was found to possess no particular advantage under ordinary studio conditions.

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[1] The use of a sectional flip-card is illustrated in the kinescope recording "Power Supplies, No. 3," on deposit at the Special Devices Center, Port Washington, N. Y.

g. Models, mock-ups, cut-aways, training boards, equipment

Models, mock-ups, cut-aways, training (bread) boards, and actual equipment which may all be grouped in a general way, lend themselves readily to demonstration by television. Educational programs by commercial stations, scientific and informational programs telecast from WOI-TV, Iowa State College, as well as work at The Special Devices Center and The Signal School, Ft. Monmouth, all show that visual training aids of this type can be advantageously presented by television.

Size: magnification can be accomplished by means of the television camera making it unnecessary for models and similar training aids to be as large as needed for a standard classroom. Magnification makes it possible for parts of training aids to be presented with almost the same effect as a close-up personal examination.

A television camera is usually equipped with three or four lenses in a turret for switching quickly from one size picture to another. The variety of picture sizes not only makes adaptation to teaching needs possible but offers relief from the monotony of a constant picture size.

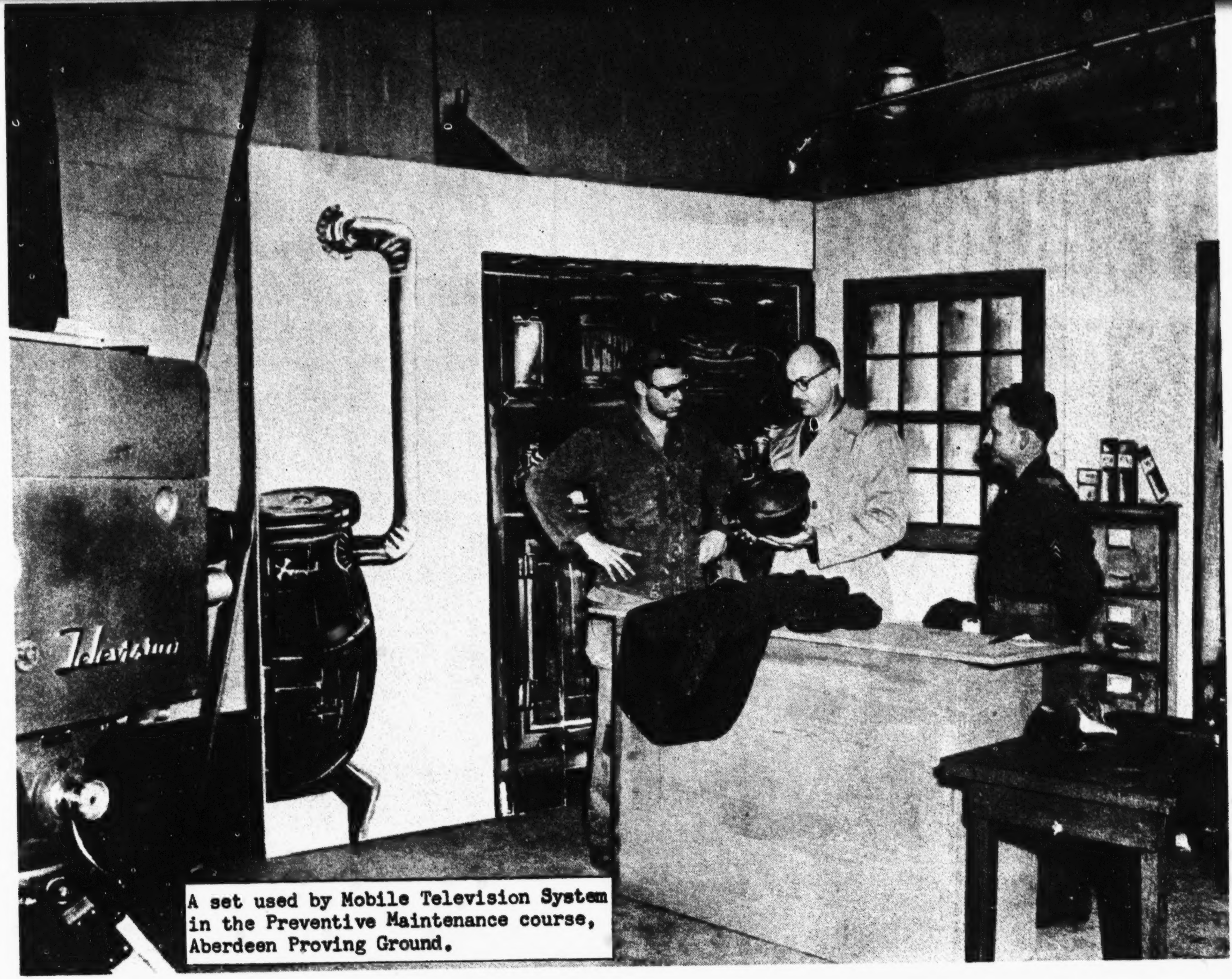
A small industrial television camera can be attached to a microscope for the showing of microscopic situations. Because the

Vidicon tube in an industrial camera responds even at low-level lighting, it is reported to be particularly useful for the showing of delicate biological materials.

Complexity: there is no evidence to indicate that the principle of simplicity can be violated any more on television than in the classroom. In fact, because the television screen has only a partial third dimensional effect, it is necessary to call attention to the specific parts of a mechanism. The situation is similar to showing a photograph of a complex object--the instructor must point to the specific part which he expects the trainee to see.

Confusion caused by presenting a complex mechanism can be partly overcome by painting parts or edges of parts so that a contrast will be obtained. The instructor must always keep in mind that it is his job to help the trainee make visual differentiations.

Color: colors which may be easily distinguished by the human eye on the basis of chromatic differences may photograph in the same shade of gray. For this reason, models and especially cut-aways may need to be repainted so that the different parts can be more easily distinguished. Although a person skilled in the analysis of color can make fairly good judgments of the gray values of chromas, the simplest procedure is to place an object before a television camera and determine the ease with which visual distinctions can be made. If color is an absolutely essential element, then television may not be applicable but such a situation is not frequently encountered. A


Television

A set used by Mobile Television System
in the Preventive Maintenance course,
Aberdeen Proving Ground.

training aid painted in contrasting shades of gray may be very drab for the regular classroom but quite acceptable and effective for television.

h. Rear Screen Projection

Rear projection of motion pictures and slides on a translucent screen can add greatly to the scope and flexibility of training by television. A wide variety of backgrounds, maps, charts, diagrams, and photographs can be displayed in large size. The need for studio sets is reduced. Large graphics are not necessary because a small slide can be enlarged to wall size, thus materially reducing costs.

A very useful compilation of information on rear screen slide projection has been made by The Special Devices Center.[1]

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[1] Stange, Fredric. "Report on Rear Screen Slide Projection." Special Devices Center, Office of Naval Research, Department of the Navy, Port Washington, L.I., N. Y. NAVEXOS P-991, June 1952, 40 pp., illus.

PART II

TELEVISION IN ARMY TRAINING

D. Television Equipment

It is recommended that:

1. The inexpensive but effective lapel microphone be used.

2. Two cameras be provided in the studio but that it be kept in mind a satisfactory job of teaching can be done with one camera in case the other has failed.

3. A large studio monitor, properly placed, be provided so that the instructor can readily observe his own teaching.

4. Fluorescent lighting be used in the studio with portable floodlights on training aids when needed.

5. Lighting in classrooms be practically normal, avoiding reflections by the television receiver screen.

6. In mass teaching, intercommunication be provided only where deemed indispensable, to be determined by local command.

7. A large size television receiver screen, 19 inches or larger, be used in the classroom.

8. Large screen television projectors not be used.

9. Simple, inexpensive tripod camera dollies be used.

10. Distractions due to "burning-in" effects on tubes be avoided by proper manipulation of studio equipment.

11. Proper card stands, holders and other display devices be provided.

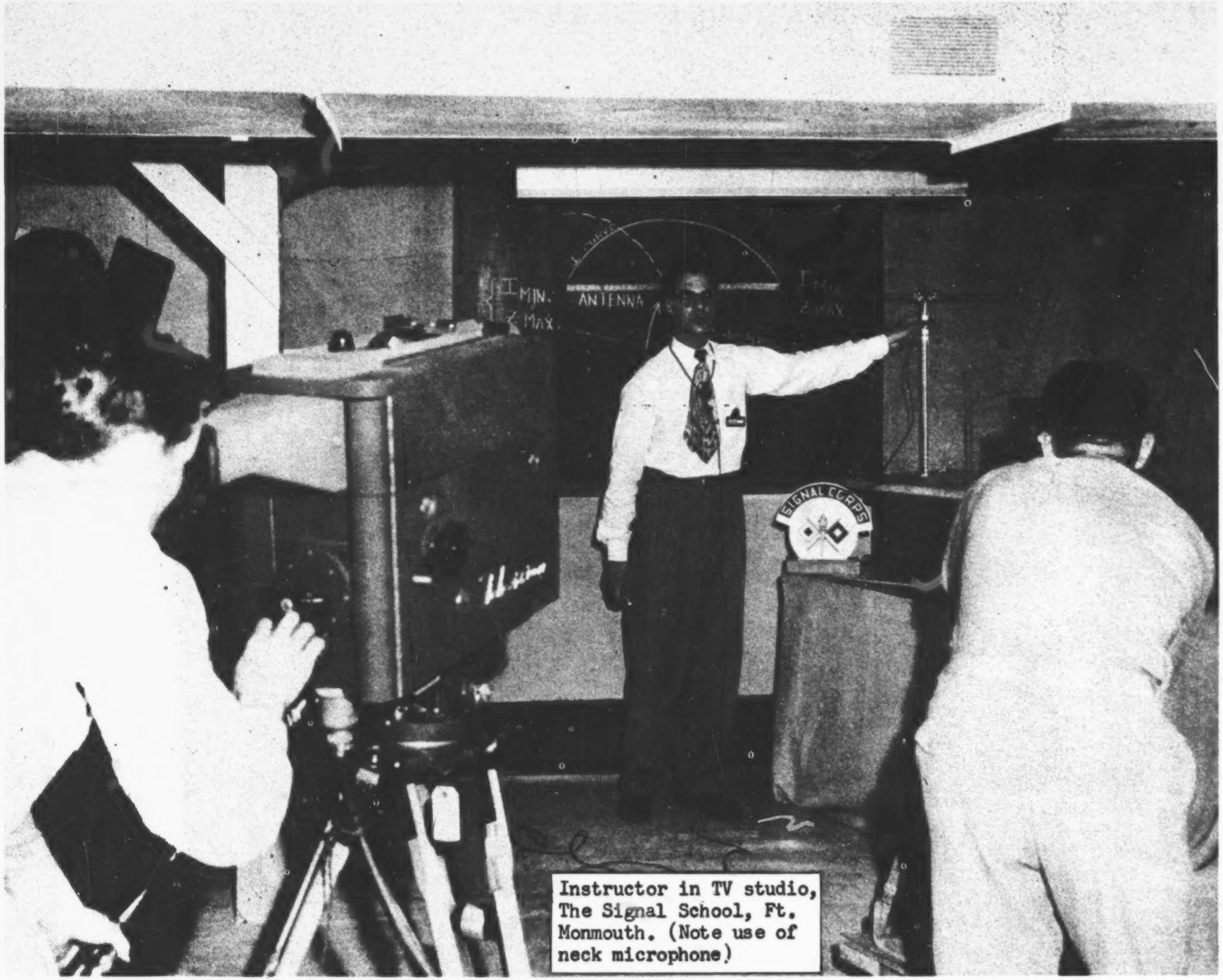
12. Television projection equipment be provided for the showing of films, film strips, slides and kinescope recordings.

13. The possibility of producing kinescope recordings be given serious consideration.

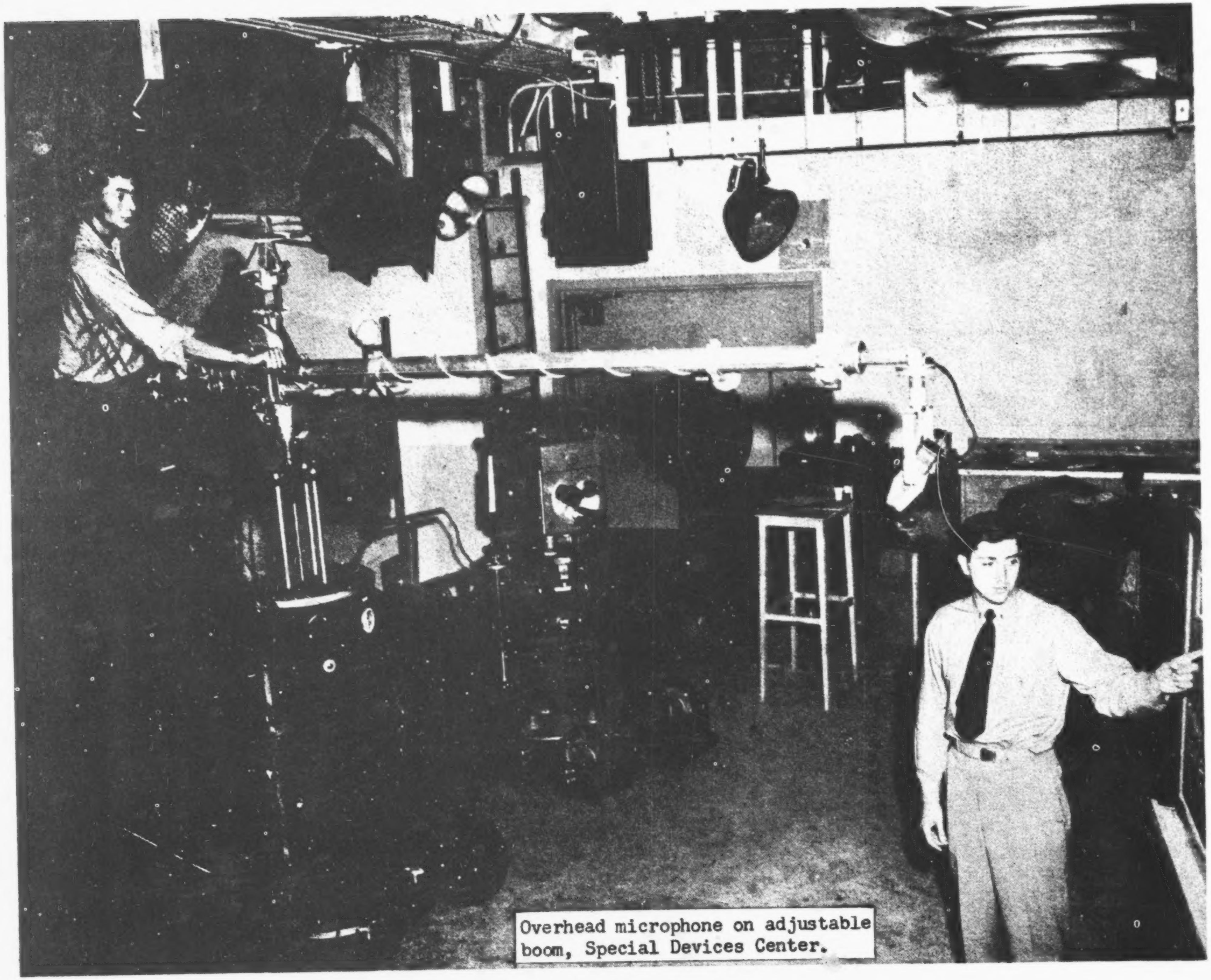
14. A closed circuit be considered standard but a supplementary open-circuit added where local requirements are deemed to make it highly desirable.

D. Television Equipment

Teaching by television requires considerable equipment not found in the usual classroom. Because this equipment was developed for commercial use, special study is necessary to determine its applicability to educational television. Considerable variety is now available and optimum equipment facilities will need to be determined through actual trial. Requirements peculiar to the teaching situation may call for specialized adaptations or even the development of equipment not now available.


I MIN.
Z MAX.
ANTENNA
SIGNAL CORPS

Instructor in TV studio,
The Signal School, Ft.
Monmouth. (Note use of
neck microphone)



Overhead microphone on adjustable boom, Special Devices Center.

1. Lapel vs Other Microphones

The lapel microphone can be attached by means of a clip to the tie of the instructor and the cord can then be passed over the shoulder and down the back, trailing with little inconvenience from under the coat. The tie position permits the head to be turned sharply to either side without carrying the mouth more than a few inches away from the microphone. This is a distinct advantage over placement to one side as in the case of attachment to the coat lapel.

Another satisfactory method is to suspend the microphone from the neck by means of a loop, allowing it to rest against the chest some 6 or 8 inches below the chin, with the cord dangling in front of the instructor. This method permits the removal of coat and tie in the heat of summer.

Overhead microphones not attached to a boom but fixed in position have the disadvantage of restricting the movement of the instructor. Any movements which will take him away from the microphone such as walking to demonstrational equipment or turning to the blackboard or moving to posted charts will seriously alter the audio. It was found that a lapel microphone gave a much more nearly constant sound level.

An overhead movable microphone on a boom is an advantage where much movement is required and a trailing cord becomes a handicap. The disadvantages are high cost, need for one or two men for operation, interference with cameras unless all moves are carefully planned in advance, increased distraction for both instructor and panel, and greater space requirements of the studio.

For some time the pencil microphone, the familiar stick-like device, has been used for interviews and certain educational programs in commercial television without the user making any effort to conceal the fact that a microphone is being used. In educational television, appearances are not as important as in certain types of commercial programs. In fact, there may be a psychological advantage in showing concern with the serious business of learning.

2. One-camera vs two-cameras

The advantages of a single camera chain (camera plus synchronous generator, camera control monitor, and power supply) are: (1) minimum equipment, (2) minimum operational personnel, (3) a less cluttered studio, and ability of the instructor to dominate the studio situation by centering his activities on one camera.

The disadvantages of a single camera chain are: (1) distracting lens changes, (2) distracting focal changes, (3) blackout periods when the camera is directed to another part of the studio, (4) a "swimming" effect if the camera is rapidly "panned" to another position without a camera blackout, (5) dollying while trying to maintain focus, and (6) a complete cessation of the lesson in case of a mechanical failure in the camera.

A two-camera chain has certain advantages: (1) fewer distractions from lens changes, (2) fewer distractions from adjusting picture focus,

(3) avoidance of camera blackouts, (4) dollying with one camera while other camera takes the picture, (5) a greater variety of shots to reduce monotony, (6) more shots from a variety of angles, (7) relatively little time lost in directing shots from one part of the studio to another, (8) possibility of using superimposition and split-screen technique, and (9) continuation of the lesson in case of mechanical failure of one of the cameras.

The disadvantages of a two-camera chain are: (1) complexity of equipment, (2) greater number of operating personnel, (3) a more crowded and cluttered studio, (4) constant alertness of the instructor so that he will be aware of which camera is taking the shot, and (5) tendency toward a director-dominated rather than an instructor-dominated presentation.

A closed circuit single camera chain is the minimum equipment necessary for television operation. After some months of experimental telecasting at Fort Monmouth during which only a single camera was used, it is evident that teaching can be successfully carried on with minimum equipment. However, it is believed that the advantages of a two-camera chain are sufficiently great to warrant its consideration as a standard television installation. One advantage alone, that of continuing with a second camera in case of a mechanical failure, becomes extremely important in mass telecasting to hundreds or even thousands of trainees at one time.

3. Studio Monitor

A studio monitor is highly desirable when an instructor does not teach a well rehearsed and fixed program from a memorized script. When the informal approach is used, every lesson is partly a developmental situation and it is highly desirable that the instructor be able to check his own presentation moment by moment.

It was found that experienced television instructors rely upon the monitor much more than do the inexperienced. Once an instructor becomes thoroughly aware that what he sees in the monitor is what the trainees are seeing, he tends to "build" screen pictures, by manipulating visual aids to create the most desirable effects.

Care should be taken to put the studio monitor in a place where it will be easily seen and the view not obstructed by the camera. A position approximately four feet above the floor has been found satisfactory. A sixteen-inch monitor located about ten to twelve feet from the instructor was much preferred to a ten-inch monitor. Because an instructor often checks himself with just a glance, it is desirable that the picture be large for efficient vision.

4. Studio Lighting

Only a moderate amount of studio lighting is required for successful television as compared to the relatively high levels commonly employed in the moving picture industry. At Ft. Monmouth adequate lighting was possible with six pairs of 40 watt fluorescent lights placed at a height of 7½ feet and two pairs placed vertically just above the floor but shielded from the camera.[1] Small portable flood-lights using 200 watt incandescent bulbs were helpful when extra lighting was desired for training aids.

Fluorescent lights operate at a much lower temperature than incandescent bulbs, and their use will result in a cooler studio temperature with greater comfort for the operating personnel. If studio space is limited and the ceiling low, heat production from incandescent lights becomes a problem, especially in the summer time without air conditioning.

WOI-TV, Iowa State College, depends mainly upon fluorescents for studio key-lighting with some use of incandescents to cut flatness. Slim-line fluorescents are favored because of compactness and light weight, and because they produce a type of light favorable to television.

The substitution of several tubes of yellow fluorescent lights at Ft. Monmouth was of no detectable advantage and because yellow light is not well adapted to the characteristics of the image-orthicon television tube, the result was probably only to cut down the amount of studio light available.

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[1] The vertical low-level lights were an aid in cutting prominent shadows cast by the nose and chin.

A proper distribution of light can do much to help create the illusion of depth but this is not ordinarily an important problem in educational television. If the light distribution is such as to eliminate prominent, distracting shadows, and if training aids are sufficiently lighted to produce good visibility, acceptable results are achieved. Flat lighting, mostly in one plane overhead, seems to give a considerable amount of three dimensional effect and along with the restrained use of incandescent floods, produces satisfactory lighting without discomfort to the instructor. However, this does not mean that experimentation with lighting to fit local studio conditions is to be discouraged. Some modification to fit specific lessons may be desirable.

With respect to lighting, outdoor operation of television is relatively simpler than indoor operation and can be conducted in general according to basic principles of elementary photography making use of natural lighting. Mobile Television System has been functioning successfully outdoors, producing programs for the courses in preventive maintenance.

5. Classroom Lighting

Television can be viewed in a room where the light level is practically normal. In fact, it has been suggested that the tendency to sit in a darkened room is a carryover from moving picture conditions.[1] An important consideration in the summer time is the fact that television can be viewed with windows open for ventilation.

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[1] Commery, E. W. Op. cit.

Light sources may need to be controlled and the television receiver so placed that light reflected by the screen is avoided.

Colored light in the classroom is undesirable because an unnatural visual situation is created. Neither instructors nor trainees at Ft. Monmouth showed any enthusiasm for yellow light when viewing television. Until some definite advantage of colored light is shown, daylight or customary artificial lighting should be used.

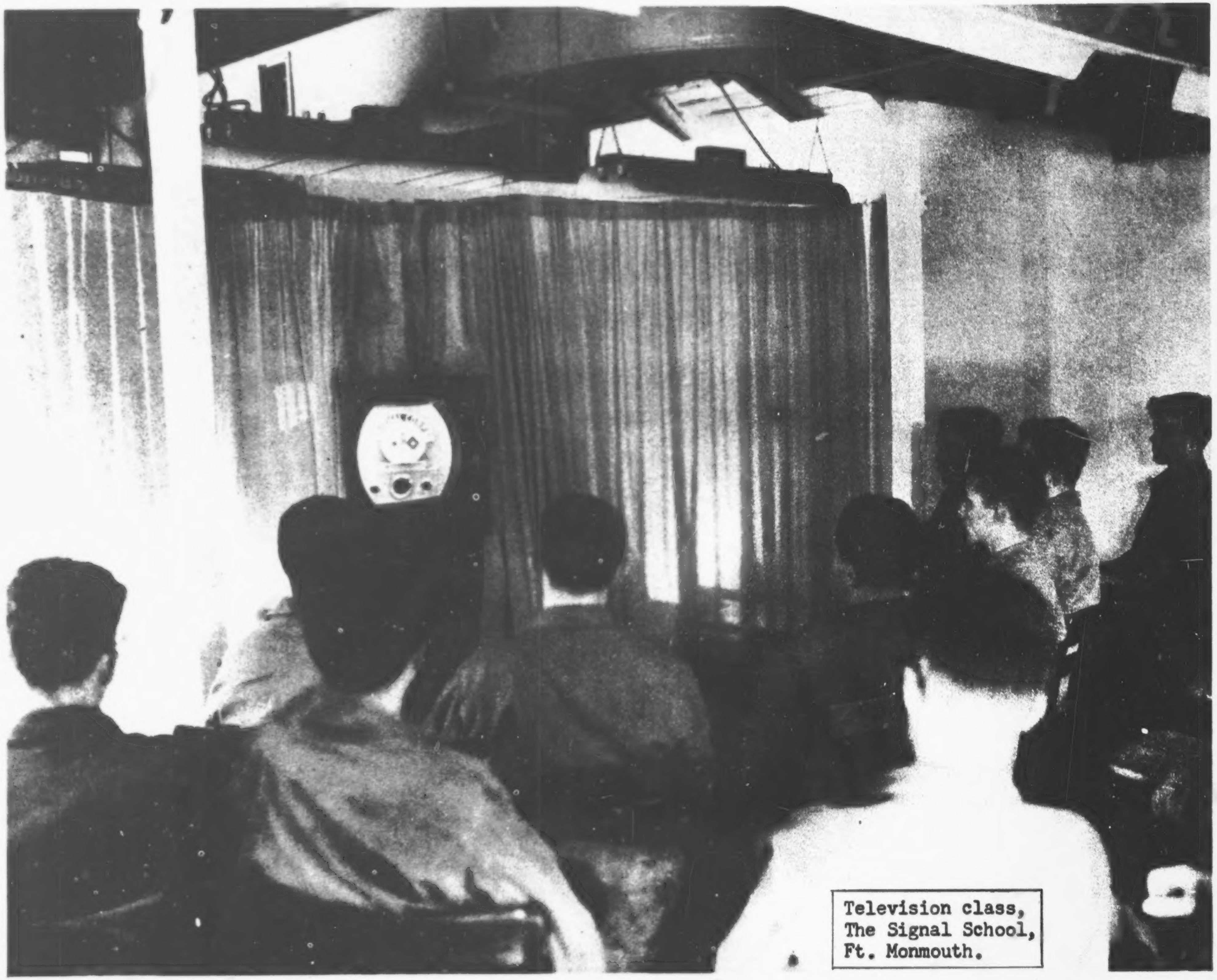
6. Intercommunication System

Critics frequently attack education by television on the ground that intercommunication between student and instructor is not possible. The widespread acceptance of this principle of intercommunication in educational circles requires that the criticism be given serious consideration.

Intercommunication is desirable in so far as it stimulates student interest, creates a feeling of student responsibility, aids in the immediate clearing up of material not well understood, and helps the instructor in judging learning activity. However, it may be asked whether the insistence upon intercommunication in Army technical training is based upon demonstrated effectiveness. Many student questions need not be asked because they are irrelevant, a method of gaining attention, too advanced for the material at hand, a student-test of the instructor's knowledge, or so elementary that the class as a whole does not profit from the question. It has been argued that an instructor may so teach that few questions will arise. Yet the importance of student participation in Army training is traditionally great. Classes at Leavenworth, West Point, and in fact all service schools encourage and require student's recitations, questions and answers, and discussions. It would seem to be even more important that newcomers to the army in mass training receive the same opportunities for communication with the instructor. It is extremely doubtful that a panel or other substitute can afford these opportunities.

At Ft. Monmouth an intercommunication system was provided. When a small red light glowed in the studio the instructor was made aware that someone in the television class desired to ask a question. It was noted that relatively few questions were asked during a telecast for which there are several possible explanations: (1) trainees may have felt no particular responsibility in asking questions because the personal contact was lacking, (2) it was not quite as convenient to ask a question as in the regular classroom, (3) the courses are well organized and taught by trained instructors thoroughly familiar with the subject matter, (4) the panel of three trainees in the studio were asking questions and also were questioned by the instructor thus serving as a class substitute, (5) the instructors made use of rhetorical questioning, and (6) the instructors met the classes personally for about half of the periods at which time the trainees could ask questions.

This situation suggests that in mass training by television, inter-



Television class,
The Signal School,
Ft. Monmouth.

communication is not needed if a studio panel is utilized during the telecast and all trainees can ask questions during the application periods later. It was noted and verified by the instructors that attention given to the television screen was good, better than that given an instructor in a face-to-face class situation, and that there was very little if any loss in attention after five weeks of television observation.

7. Size of Receiver Screen

Screen size is important because it limits the number of persons who can view a lesson at one time. A small screen requires that the observers sit close to the screen with the result that only a small group can be accommodated. Earlier studies indicated that a screen size of sixteen inches was adequate for twenty trainees and permitted the use of movable desk-chairs for writing.[1] Although television classes at

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[1] Rock, R. T., Duva, J. S., and Murray, J. E. "Training by Television. A Study in Learning and Retention". Special Devices Center, Office of Naval Research, Department of the Navy, Port Washington, L. I., N. Y. SDC Report 476-02-3, NAVEXOS P-850-3. (Not Dated)

Reynolds, Dana D. Training by Television. A report covering the work of Special Devices Center in television. Sept. 1949. Filed with Human Engineering Division, Special Devices Center, Port Washington, L. I., N. Y.

Ft. Monmouth varied in size from fourteen to eighteen, the classroom had places for twenty trainees.

A formula has been proposed for determining how far from the screen a viewer should sit: viewing distance should be ten times the tube size in inches plus two feet.[1] It is obvious that this rule can only be approximated with groups of twenty, particularly, if the further suggestion is followed that all trainees be seated for comfortable viewing within a seventy degree angle.[2] This restriction on side viewing will result in arranging the group in a narrow formation in depth.

When the trainee is sitting close to a small screen or at a distance from a larger one, the visual angle subtended by the screen is smaller than is generally appreciated and viewers are surprised to learn that television observation is physically equivalent to looking at an area about the size of a postage stamp at reading distance.[1] A large screen has a psychological advantage because it produces an illusion of space and distance, and this may partly account for the finding that both trainees and instructors at Ft. Monmouth preferred a nineteen-inch screen to a sixteen-inch even though the physical facilities were not altered.

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[1] Commery, E. W. "Studies of the visual and lighting problems of television in the home". Illuminating Engineer. July, 1950, XLV, pp. 433-43.

[2] Rock, R. T., Duva, J.S., and Murray, J.E. Op. Cit.

8. Large Screen Television Projectors

Equipment is available by means of which a large television picture can be presented. The most obvious advantage is the large size so that a number of persons, many more than usual, are able to view a production. However, there are certain disadvantages: (1) a completely darkened room is required as for front projection of moving pictures, (2) the mechanism requires delicate adjustment, (3) there is a certain amount of degradation of picture due to the increase in size, and (4) there is a danger of Gamma radiation.

Mobile Television System is equipped with a large screen projector capable of producing a picture six by eight feet in size. The chief complaint concerned the time required to keep the projector in proper adjustment.

At present, there seems to be no compelling reason for substituting large screen projectors for the usual television receiver.

9. Camera Dolly

The simplest and least expensive camera dolly consists of a rigid wooden tripod mounted on small wheels with an adjustable head at the top on which the camera is mounted. This type of dolly is commonly found in television studios and is used at Ft. Slocum, Ft. Monmouth, and Special

Devices Center. Advantages are: (1) simplicity, (2) low cost, (3) small size so that a minimum of space is used, (4) light weight, (5) maneuverability under control of the camera man, (6) speed with which it can be whirled about or moved from one position to another, and (7) ease of dismantling and transporting.

Disadvantages are: (1) camera man must attend to the dolly and therefore cannot give complete attention to camera adjustments, (2) camera must be operated at a fixed height above the floor during a telecast because changes in height are not quickly or easily accomplished, and (3) directional control is difficult because the three wheels on which the dolly is mounted do not coordinate readily. Technicians at Ft. Monmouth considered that they had overcome the third disadvantage, by mounting two wheels in a fixed position capable of only forward and backward movement, and permitting the rear wheel to swivel. This modification has merit and should be given a trial in other studios.

It is conceivable that the mechanically more elaborate dollies which carry both camera and cameraman on a boom may be an advantage in the presentation of certain types of Army training by television but observations on this situation were not made in this survey. The standard tripod dolly was considered satisfactory for the television teaching observed.

10. "Burning-in" Effects on Tubes

Television camera tubes possess a certain amount of persistence of image which under proper conditions is not noticeable. If, however, a camera is focused on a situation having high light-contrast and then directed to another point, a ghost image of the first situation can be seen mingled with the new picture. This effect is frequently seem when a camera has been centered for some time without movement on charts, diagrams, and printed captions and then directed to a new shot. "Burning-in" effects become more noticeable with increasing age of the television camera tube.

The distraction in viewing due to "burning-in" may be avoided by using two cameras, switching in order to allow time for recovery. Another aid is to avoid high light-contrast, keeping the contrast ratio under 1:25. Moderate studio lighting is a help. With reasonable care, "burning-in" can be kept to a minimum and studio that possesses only a single camera can still operate successfully.

11. Card Stands and Holders

A studio should be supplied with at least one light wooden easel-like frame on which printed or illustrative materials can be exposed before the camera. The simplest card stand is a frame with a narrow shelf on which the cards rest and lean back slightly against the frame. They can be changed readily one by one at any desired rate. A slight variation consists of placing the cards on two large rings through holes at the top and turning them down in serial order before the camera.

A revolving drum or a wind-up roll may be used if it is desired to present material in a continuously moving sequence instead of intermittently, as with cards.

A number of display devices, most of them quite simple, can be used but a selection should be made to best fit the needs of the different kinds of training situations.[1] Shiny surfaces that will reflect the light are to be avoided. The principle of low-contrast light ratios should be observed in preparing the cards or illustrative material.

12. Equipment for Films, Film Strips, Slides

Frequently it is desired to show films, film strips, or slides for a portion of a class period. Gathering in a large room for a short time to view films and then reassembling again elsewhere for television is inefficient. The ideal situation is to present films and slides on the television screen at the moment called for by the lesson plan. Therefore, the television studio should be provided with equipment for showing moving picture films and kinescope recordings, film strips, and slides.

Special equipment is necessary for adapting moving picture film (as well as kinescope recordings) to television conditions. This is because sound-film is projected at the rate of 24 frames per second while television pictures are presented at 30 per second. It is reported that a new type of television projector will be available in the near future employing the principle of the "flying-spot scanner," thus eliminating some mechanical deficiencies of present equipment.

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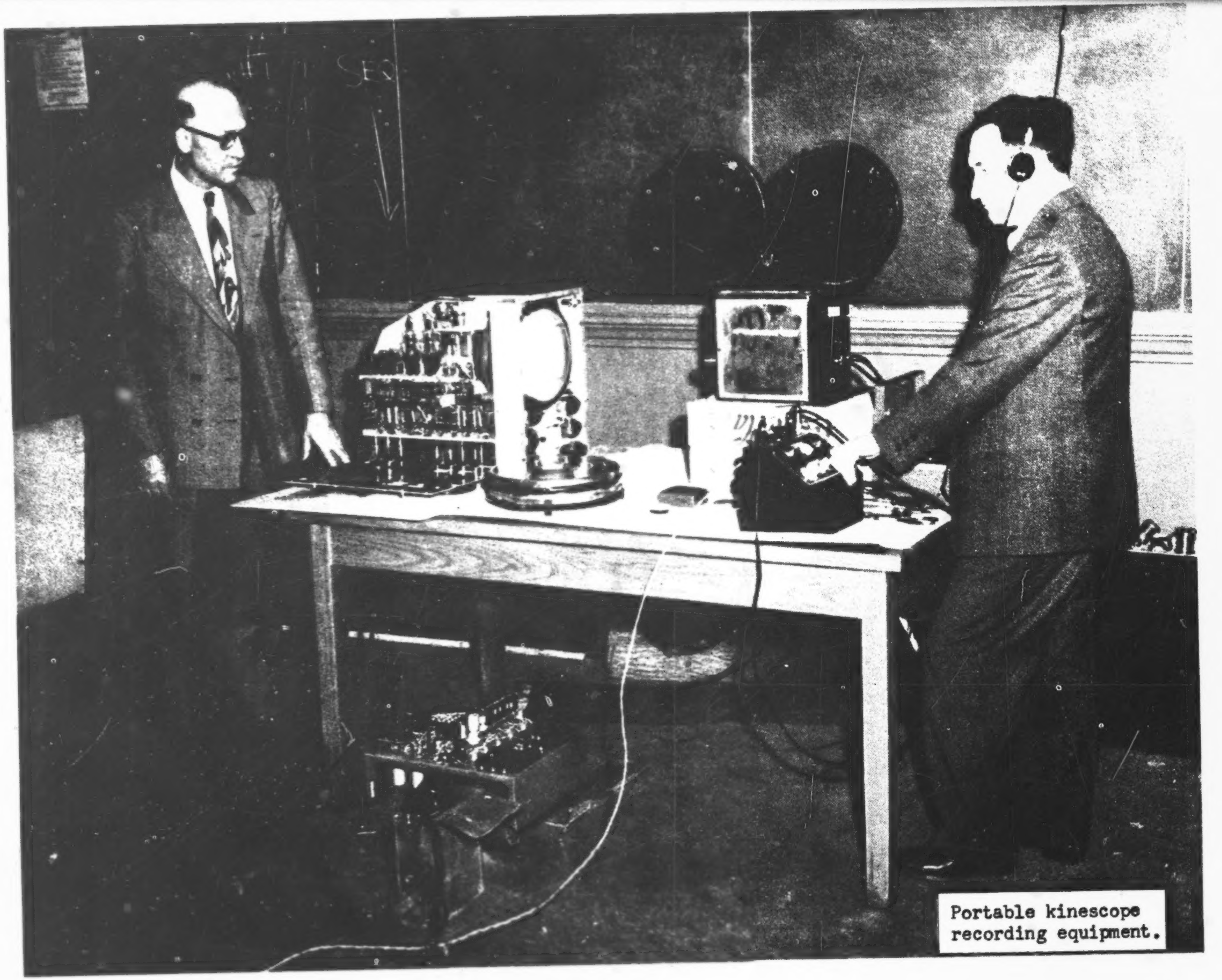
[1] For a description of a number of display devices see: Speece, Maynard A., Skelsi, Alice F., and Gapen, Kenneth M. Television Report. Section II, Visual Aids. Radio and Television Service, Office of Information, U.S. Department of Agriculture. June, 1951.



Portable kinescope
recording equipment.

Although moving picture film shown via television is usually not as good as a live telecast, the loss in picture quality can be more than offset by the advantages of integration in the program, showing in a lighted and ventilated room, and convenience because the usual projectors will not be needed.

13. Equipment for Kinescope Recordings

A television program which has been placed on film, usually 16-mm, is known as a kinescope recording.

Equipment for making kinescope recordings is costly and requires considerable operating skill in order to produce satisfactory recordings. However, it is probable that portable, less expensive equipment will be available in the near future making it possible to record television programs economically. The recording of certain television programs at Aberdeem Proving Ground in connection with Mobile Television System demonstrated that readily portable kinescope recording equipment has been developed.[1]

The acquisition of equipment for making kinescope recordings may be left a matter for local decision. If a number of military installations are provided with television facilities, a central recording service should be given consideration.

Kinescope recordings are further discussed in section G.

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[1] The services of Mr. Earl Daugherty, Earl Daugherty Film and Sound Services of Queens, New York were secured for making kinescope recordings at Aberdeen.

14. Open and Closed Systems

By means of open circuit equipment, it is possible to carry on television activities in the field or to operate from almost any part of a military installation. This mobility is useful when showing tactical situations. Infantry maneuvers, artillery emplacements and fire direction centers, armored movements, airborne tactics, and many other field activities can be demonstrated. Running commentaries by qualified officers may make the telecasts of greater value to trainees than actual observation.

The development of a one-man portable outfit, popularly referred to as a "walkie-lookie", provides even greater mobility than was formerly possible. This development offers not only increased efficiency in training in field operations but an extension to observation of actual combat. Maximum mobility is achieved when equipment is installed in planes.

If it is desired to telecast from widely separated points in an Army post or camp, the use of a closed circuit presents difficulties because of the inconvenience of handling the coaxial cable. Moreover, without special relay equipment the operating distance is limited to about two thousand feet. An open circuit is a solution to this problem because it extends the range of operation.

Although the use of an open circuit system has advantages, there are also certain disadvantages. These disadvantages at times are so great that the use of an open circuit may be undesirable or even impossible. A serious limitation is the "line-of-sight" required for the transmission of high frequency waves. Buildings or natural obstructions such as hills interfere with operation so that it may be necessary to erect towers, mount a tower on a truck, or to establish relays.

Another limitation is that security restrictions cannot be rigidly observed. Unauthorized persons may with proper equipment pick up the television signal. Security is not a consideration with a closed system.

High frequency telecasting is subject to some interference from stray radiations in areas where other electronic equipment is operating. Local confusion or even complete blocking of operation may result if channels of operation are not respected. If a particular Army post, camp, or station should decide to use an open circuit, definite reservation of a channel should be made. Engineers report that a favorable area for reservations lies just beyond commercial Channel 13.

PART II

TELEVISION IN ARMY TRAINING

E. Television Operational Techniques

It is recommended that:

1. Diagrams and drawings be kept compact on a blackboard, that the amount of writing be somewhat restricted, and the rate of writing deliberate.

2. Close-up shots be used liberally.

3. Superimpositions be used where it is desired to show relationships.

4. Fades and dissolves be employed as transitional techniques but that they should be used sparingly.

5. An occasional panning of the camera be used for spatial orientation and to provide a panoramic effect.

6. Whenever a subjective presentation is an advantage that over-the-shoulder (zero angle) shots be used.

7. Studio settings be simple ("quiet") to avoid the distractions of a complex ("noisy") setting.

8. A lesson be instructor-dominated and remain essentially so when two cameras are used.

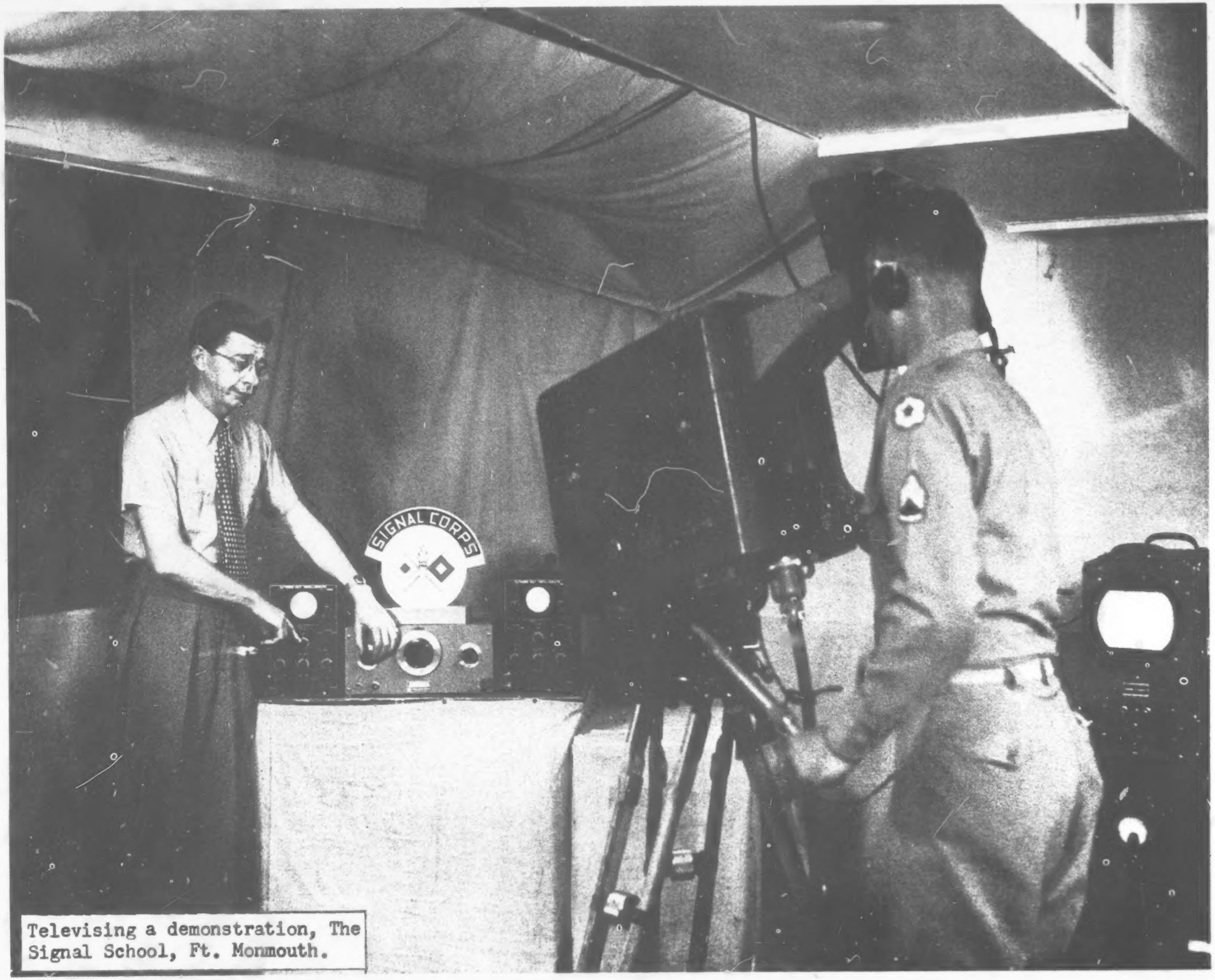
E. Television Operational Techniques

Television, because it is mechanically complex, introduces a number of problems related to the manipulation of equipment. Because it is new, standard procedures are in the developmental stage and much remains to be learned especially with respect to educational applications.

Within a few years, commercial television has produced a number of techniques which are rapidly becoming standard; some of these are new and peculiar to the medium of television while others have been carried over from radio and the theatre. However, it should not be assumed that all manipulative techniques found to be successful in commercial television can or need be carried over and applied with equal success to educational television. The objectives of the two are different and although an overlapping is to be expected, there should be no hesitation in developing techniques which will be peculiar to each.

1. Use of Blackboard

A blackboard, so useful in the standard classroom, is also valuable in educational television but its use needs to be slightly modified. Diagrams and drawings must be more compact for if they are so sprawling that the camera can pick up only a limited section with suitable magnification, trainees complain of a feeling of "wanting to see more".


SIGNAL CORPS

Televising a demonstration, The
Signal School, Ft. Monmouth.

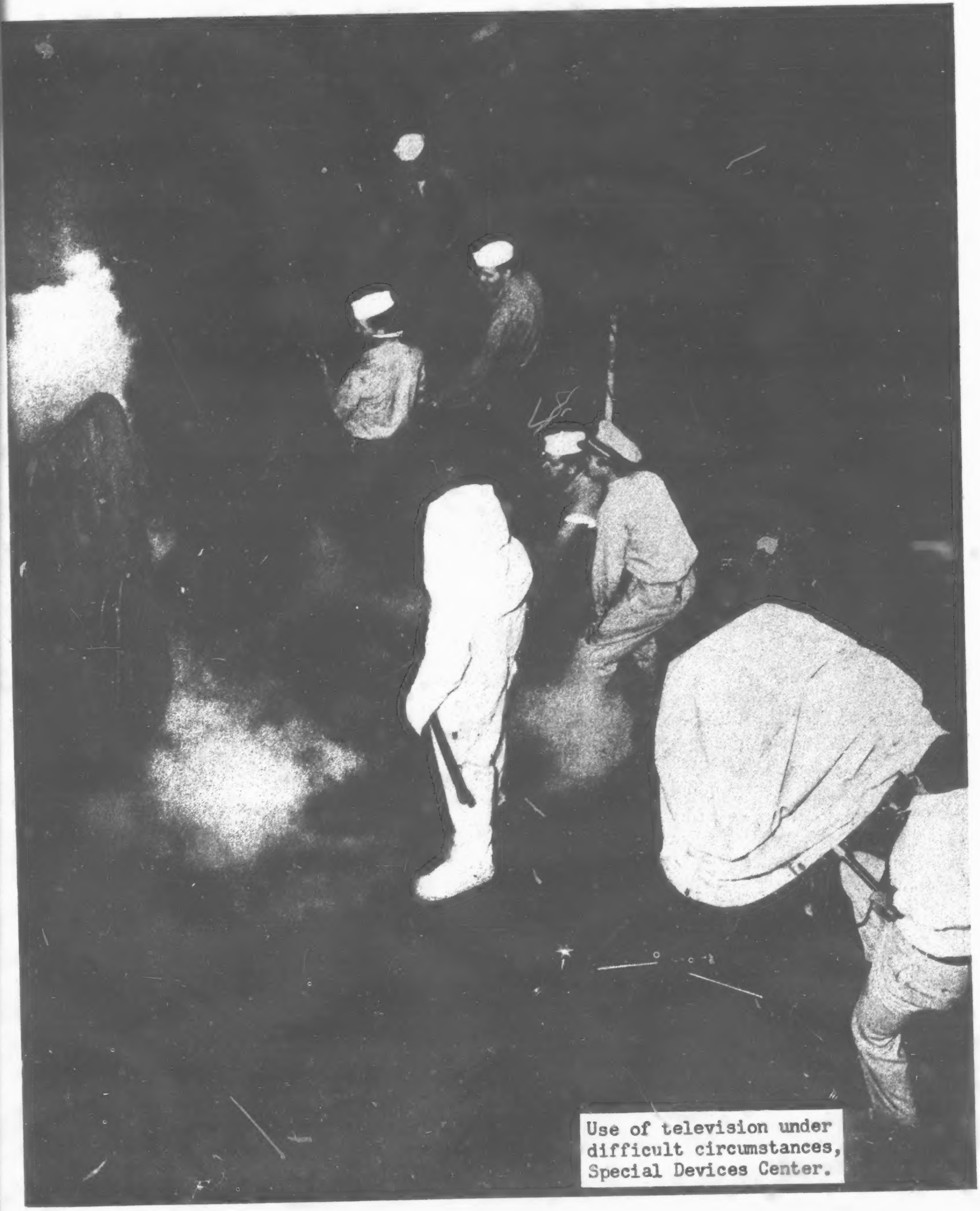
The amount of writing should be kept to a minimum by the use of short phrases or single well-chosen words. A great amount of blackboard writing may not be objectionable in the standard classroom where it may even serve to capture and hold attention but on the television screen it results in a feeling of "busyness" which is distracting. The rate of writing should be deliberate.

2. Close-ups

By means of the television camera, objects can be shown as though viewed from a personal close-up position. Small objects can be shown with great enlargement and with proper equipment even microscopic objects can be pictured. Small industrial cameras are now available which can be taken into places not ordinarily accessible to a class such as the interior of a tank.

When two cameras are used, one can be giving the viewer an orientation by means of a medium shot while the other is getting set on a close-up. Then, a switch from the medium to the close-up instantly presents the viewer with a "front seat" point of observation or even presents a situation approaching in-the-hand examination. Although two cameras are more efficient, one camera can be used if time is allowed for dollying into position and some allowance made for the distraction of focusing.

With proper long-shot lenses, the handicap of distance can be quickly overcome. Outdoors, remarkable flexibility is afforded by the well-known Zoomar which is a variable focal length lens.



Use of television under difficult circumstances, Special Devices Center.

Its use makes possible changes in shots from long to close-up, and vice versa, without switching cameras. It also finds indoor use although a slightly higher light level is needed than for other lenses.

It is probable that the possibility of taking close-up shots is one of the most valuable characteristics of television for educational purposes. Viewers can see the details of a demonstration more intimately than is possible in the usual classroom. There is a maximizing of the learning process.

3. Superimpositions

The technique, common in commercial television, of placing one picture over another so that both may be seen simultaneously, has usefulness in educational television. A kinescope recording made at the Special Devices Center by a Signal School instructor from Ft. Monmouth demonstrated the use that can be made of the superimposition.[1] In presenting the lesson on Power Supplies for Radio Electronics, an oscilloscope wave was "supered" on the manipulation of a training board to show wave rectification. This made it unnecessary to go back and forth between two situations in order to show how the effect was brought about.

The use of "supers" adds variety to a television presentation and is a good way of showing cause and effect in close relationship.

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[1] Kinescope # 3, "Power Supplies", on deposit at Special Devices Center, Port Washington, New York.

4. "Fades" and "Dissolves"

The "fade" is a slow disintegration of a television picture ending with a black screen. It is commonly used in commercial television to show the lapse of time and visually serves much the same purpose as the "musical bridge" in radio. A "fade in" reverses the process by starting with a black screen and slowly establishing a clear picture.

The "dissolve", closely resembling the fade, consists of a simultaneous disintegration of one picture and the building up of another. It is also a transitional technique used to replace an abrupt cut from one television situation to another.

Although fades and dissolves have a dramatic quality, this factor can easily be overemphasized in the teaching situation. Transitional techniques must not become a plaything and unless used sparingly may actually detract from the educational efficiency of a television lesson.[1]

The use of fades was observed at Ft. Monmouth but no systematic investigation of effectiveness was made.

5. "Panning"

For any particular ocular fixation, an individual has spread before him a visual field of approximately 180 degrees. Anything at which he looks directly is perceived in relation to the other objects in this "spread-out" field. Lack of this panorama is an inherent shortcoming of television: the viewer experiences a certain feeling of visual restriction. This can be partly overcome by "panning", that is, slowly turning a camera through an arc from one point of interest to another. If performed too rapidly, the picture is blurred, the viewer has a disagreeable feeling of being hurried, and the effect of "connected space" is lost.[1]

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[1] Stasheff, E. and Bretz, R. The Television Program. A. A. Wyn, Inc., N. Y. 1951. See page 204.

Panning is especially helpful where limitations of space do not permit a long or medium shot to give an over-all related picture of the television setting. Quick cutting from one shot to another saves time but tends to build up a series of unrelated picture segments. A perspective can be re-established by an occasional panning which renews spatial orientation.

At Ft. Monmouth it was observed that panning a panel gave an understanding of the seating arrangement at the long desk. This was impossible as long as shots were taken only of the individual panel members. An occasional panning from the panel to the instructor or from instructor to panel gave a unified perspective of the studio arrangement.

Commercial television places great reliance upon this technique and there would seem to be no good reason for doubting its effectiveness in educational television.

6. Over-the-Shoulder Shots (Zero Angle Shots)

Demonstrations frequently are not as effective as might be desired because "right" and "left" for the trainee is opposite to that of the instructor. When the trainee has equipment in his hands, he must constantly reorient himself in order to get a viewpoint comparable to that of the instructor. By means of television, it is possible to present a situation so that the trainee sees before him just what the instructor is viewing as though the trainee were looking over the shoulder of the instructor.

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[1] This is analogous to the rapid "panning" of a moving picture camera, a well-known fault of the novice.

Over-the-shoulder shots were attempted at Ft. Monmouth with very favorable results. An instructor seated at a table, was able to give directions in relay adjustments and in test set adjustments which were followed successfully by trainees. Directing the camera over the shoulder of the instructor gave a "subjective" presentation on the screen.[1] Directions were followed easily because "to the right" and "to the left" were no cause for confusion and by glancing at the screen the trainee always had a view of the training aid used by the instructor exactly like the view presented by his own.

7. "Quiet" vs "Noisy" Settings

A studio setting containing too many visual distractions is known as a "noisy" setting. An example is the use of a highly figured background with visual competition with those factors supposed to be of greatest concern to the viewer, thereby preventing the establishment of a primary center of attention. A "quiet" setting is simple and arranged so that the viewer can easily fix his attention upon significant features.

The television studio at The Signal School, Ft. Monmouth, emphasized simplicity. The walls were hung with medium yellow unfigured cloth drapes placed around the blackboard and extended behind the place where the panel of trainees were seated. Only those training aids actually to be used were placed within range of the camera.

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[1] A film is on deposit at the Special Devices Center, Port Washington, New York which shows the subjective presentation of knot tying.

Commercial television emphasizes the avoidance of "noisy" settings and there would seem to be no psychological justification for ignoring this advice in educational television.

8. Instructor vs Director-Dominated Presentations

Observation indicated that it was easy for an instructor to dominate the presentation of a lesson when a single camera was used. He always talked to the same camera, called the shots, displayed training aids to meet a single camera viewpoint, and had a constant, simple two-way orientation. Every minute of the time there was a close relationship between cameraman and instructor.

It was observed that in a two-camera telecast, there was a tendency for the instructor to lose command of the situation. To a certain extent, he was at the mercy of the director and a victim of the equipment. Looking back again at the camera, after glancing away for a few seconds, he might find that he was talking to the wrong camera. After adjusting a training aid to fit the field of one camera, he might find to his surprise upon glancing at the studio monitor that a different view was being presented, a condition he had not anticipated. Instead of the simple two-way orientation of a one-camera telecast the instructor now found himself in a shifting, fluid situation.

The two-camera telecast calls for a close working relationship between instructor and director. The instructor must be prepared to work with a variety of camera shots and accept the responsibility of providing for them. If it is assumed that the instructor knows best what should be taught, then the director must be subordinate to the instructor. A certain amount of direction from the studio floor does not seem to be undesirable for it was found that trainees did not object to an occasional remark such as, "now if the cameraman will give us a close-up."

Ingenious cameramen thoroughly familiar with lesson materials may find effective camera shots. These are visible to the director on the monitors for both cameras and he has a choice which the instructor is not in a position to make. At this point the initiative passes into the hands of the director and the lesson presentation now becomes director-dominated.

PART II

TELEVISION IN ARMY TRAINING

F. Selection and Training of Television Instructors

It is recommended that:

1. In the selection of television teachers, first consideration be given to a thorough knowledge of the fundamental materials to be taught.

2. Teachers be selected who have had training in the principles of effective instruction.

3. Attention be given to the possibility of a personality factor of "television compatibility".

4. The first lessons be taught by a new television instructor in the presence of a studio panel, this arrangement continuing for perhaps several weeks, indefinitely if desired.

5. A unit of specialized instruction be added to the instructor training services for the purpose of giving information and training in how to teach before the television camera.

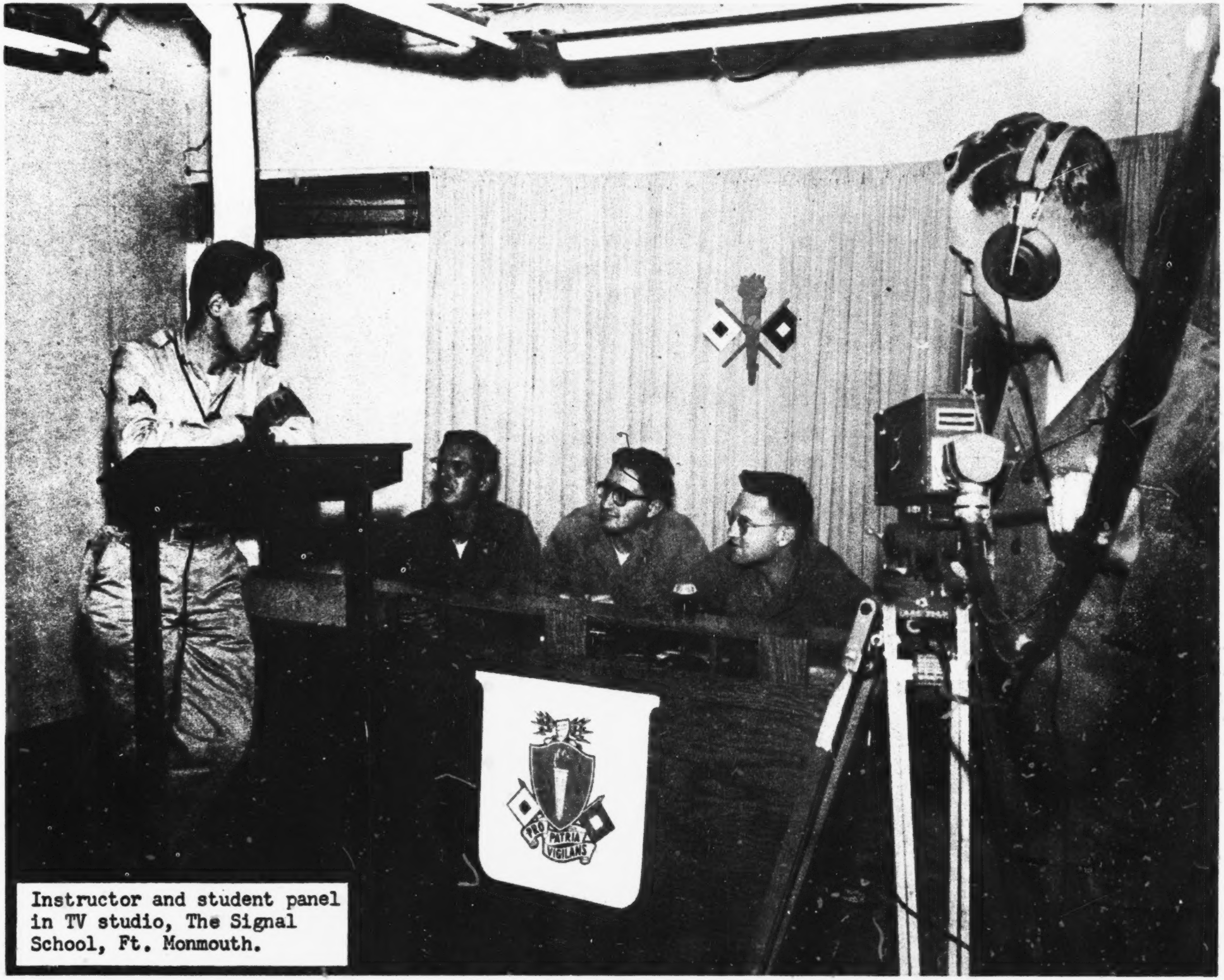
   Consideration would be given to many things such as "dry runs", practice in the proper restriction of speed of movement, keeping amount of movement to a minimum, rate of speaking, clear enunciation, camera eye-contact, dealing with problems of depth of field, "teaching by the studio monitor", how to display objects, and learning the proper use of a pointer.

F. Selection and Training of Television Instructors

Successful educational television depends upon (1) adequate technical equipment and its proper manipulation, and (2) qualified instructors adjusted to the specialized requirements of television. Consideration has been given in a previous section to the manipulation of equipment.

Commercial television stations have produced a limited number of educational programs, relying for the most part upon teacher personnel from educational institutions, and colleges utilizing commercial outlets for television programs and college credit courses have made use of their own subject matter specialists.

The complexities of television suggest that there may be serious problems in the selection of instructors and that a high degree of specialized training might be necessary to produce a satisfactory teacher.


PRO PATRIA VIGILANS

Instructor and student panel in TV studio, The Signal School, Ft. Monmouth.

If this should be the case, then the instructor becomes a definite limiting factor in educational television even possibly to the extent that military use would not be feasible. Because the instructor is so vital to educational television, it was considered important in this survey to give attention to teacher activities and training.

1. Criteria for Selection of Television Instructors

No matter what changes or adaptations must be made when teaching by television or any other medium, basic content must always be of primary concern. And because knowledge of fundamental materials is an indispensable consideration in teaching, television instructors must be selected first, just as they always have been, for their knowledge of the fundamental materials to be taught.

Conversations with experiences television instructors at Ft. Monmouth revealed the belief that "the general principles of good teaching still apply to television." This attitude was confirmed by The Instructor Training Branch of The Signal School. Accepting this viewpoint, then, all instructors selected for television would still be expected to have had the standard course in teacher training.

It is probable that in selecting instructors for television some consideration might well be given to what could be called "television compatibility". While perhaps difficult to define, it is manifested by a ready adaptation to studio conditions, a relaxed manner, an easy presentation of ideas, and an enjoyment of television teaching. Poor television compatibility might be found, for example, in those who normally speak at a rapid rate and who, when required to slow up to the extent considered optimum for television, experience frustration. Another factor to be considered is emotional tension. All instructors going before the camera for the first time reported considerable emotional tension. It is possible that habituation with elimination of this tension does not occur in all cases for it was reported that a few instructors even after considerable experience before the camera did not enjoy television teaching.

2. Training Television Instructors

Even though an instructor qualifies for television on the basis of knowledge of subject matter, standard instructor training, and probably television compatibility, some recognition of and adaptation to the peculiarities of television are necessary for efficient instruction.

The following suggestions for television teacher training are based upon observation of regularly established television classes taught by experienced television instructors, observation of instructors who were new to television, and experiences as reported by seasoned television teachers.

a. First Lessons with a Panel

When a panel of trainees was not provided in the studio, new instructors frequently reported that they were disturbed because as they put it "there is no one to talk to!" Experienced instructors reported that they did not feel the need of a panel but did enjoy having one in the studio.

It is recommended that all new instructors be provided with a panel of three trainees in the studio. Whether or not the panel is continued after several weeks can be a matter for local decision. It is not recommended that an entire class or a large panel be used because this gives the television viewers a feeling that they are looking in on a class rather than being personally addressed by the television instructor. In support of this it might be mentioned that viewing of kinescope recordings by Navy reserve officers at Iowa State College produced the suggestion that the direct approach--"he is talking to me here and now"--is more effective because of its emphasis on immediacy.

b. "Dry Runs"

All television instructors report emotional tension or even fear when appearing before the camera for the first time. Experienced instructors believe this wears off rapidly and estimate that within about two weeks, the individual is comparatively relaxed and calm before the camera.

It was found that during the first period or two, new instructors will persist in errors, e. g., moving too rapidly, or not holding a pointer in a position long enough, even after coaching.

It is recommended that all instructors be given several "dry runs" under the observation of an instructor familiar with television teaching techniques. If kinescope recording equipment is available, a recording will furnish an objective basis for criticism. Dry runs also serve to lessen emotional tension.

c. Speed of Movement

Unless informed and warned, individuals tend to make movements too rapidly when before the television camera. It is difficult for the new instructor to realize that he must make his movements slowly for best effect. Deliberate, unhurried movements are desirable especially when demonstrating training devices.

It is recommended that new instructors be given an opportunity to experience the proper rate of movement under observation and guidance. This is of special importance when an individual's natural rate of movement is rapid.

d. Amount of Movement

Unnecessary movements are distracting. Fidgeting and moving about seem to be more distracting on television, perhaps because of the high concentration of the viewer, than under ordinary conditions.

It is recommended that instructor critique give attention to amount of movement and make certain that movement is restricted without creating an unrealistic situation. It can be said of the average individual that if he is moving somewhat less than he feels like moving when before the camera his action will be optimum.

e. Rate of Speaking

A deliberate rate of speaking is desirable and for television can be much slower than for radio. Although 100 to 125 words per minute is probably a satisfactory rate,[1] this speed will be modified by factors such as complexity of ideas, educational maturity of listeners, style of speaking, and amount of visual material being demonstrated.

It may be pointed out that in television, contrary to practice on the radio, it is not necessary to talk all the time. If any important visual presentation is being made, it is possible to have long periods of silence and still maintain a high degree of effectiveness.

It is recommended that television instructors be carefully informed of the importance of speaking deliberately. If equipment is available, kinescope recordings may be valuable in helping instructors integrate speaking rate and visual presentation.

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[1] Ewbank, H. L. and Lawton, S. P. Broadcasting: Radio and Television. New York, N. Y., Harper and Brothers, 1952. See pp. 443-447.

f. Enunciation

It is important that words be enunciated properly because audio systems have certain limitations. If the voice is dropped too low at times or if the instructor slights words, a trainee may fail to get an important idea. Speaking clearly is especially important when new and unfamiliar terms are being presented.

It is recommended that audio recordings be made so that instructors can make objective evaluations of their own voices and strive for improvement. Instructor training will need to take into account audio deficiencies and peculiar accents in order to maximize television teaching.

g. Camera Eye-Contact

Edcuational theory holds that close personal contact of instructor and student is desirable for more effective learning. Television can in part simulate this personal contact because of immediacy. And the highest degree of immediacy is achieved when the viewer feels that he is being personally addressed. This requires that the television instructor "talk to the camera" thus establishing camera eye-contact comparable to the eye-contact of two persons talking to each other. In fact, every member of a television viewing group no matter how large will experience the eye-contact illusion.[1] In an actual face-to-face situation a speaker can establish eye-contact with only one member of his audience at a time.

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[1] This is the well-known picture illusion. No matter where the viewer stands, a picture of a person appears to look at him.

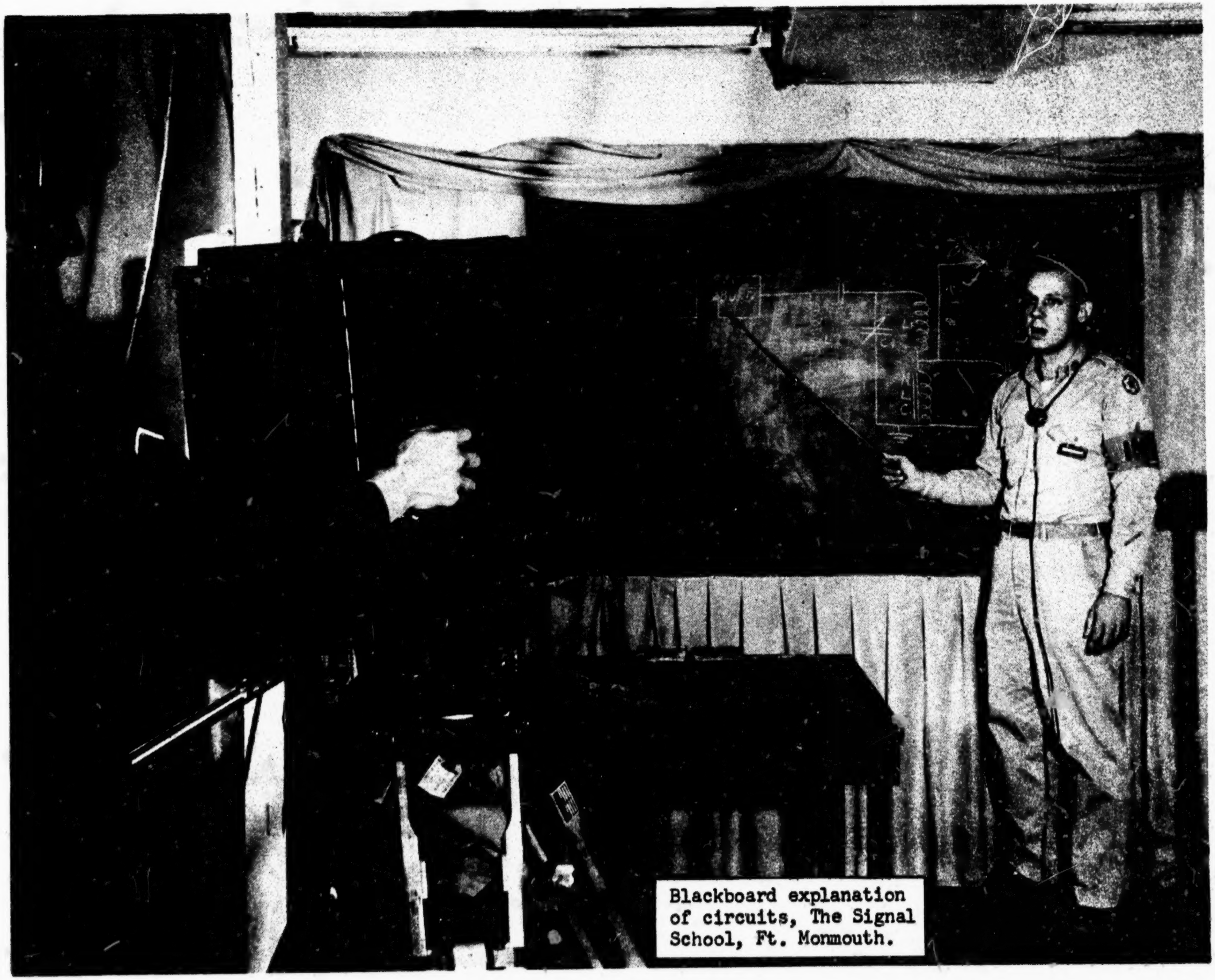
The principle of camera eye-contact was a part of television teaching technique at Ft. Monmouth. It is recommended that all prospective television teachers be taught to recognize its importance.

h. Depth of Field

Movements toward or away from the camera by an instructor result in rapid deterioration of the television picture. Quick adjustment is required by the cameraman in order to bring the picture back into focus. This change in depth of field is sufficiently troublesome so that in commercial television a mark is sometimes made on the floor to establish boundaries of movement.

In the close-up shots, depth of field becomes a problem in still another way. If the hands are stretched out toward the camera, they appear unduly large because of a distortion in perspective. At Ft. Monmouth because the operating distances were short and required much use of short shots, television instructors were encouraged to make motions close to the body and not to extend the hands toward the camera. They were also taught to cue the cameraman before making a change in position that might result in a modification of depth of field by making some remark such as, "we can show this on the blackboard". Unnecessary movements toward or away from the camera were discouraged.

It is recommended that television instructors be given information on how to cope with the problems of depth of field.



Blackboard explanation of circuits, The Signal School, Ft. Monmouth.

i. Use of Studio Monitor

The studio monitor carries at all times the same television picture that is presented to the trainees. The experienced instructor looks at this picture from time to time to check the effect he is producing, even making deliberate modifications in his teaching in order to create a more effective television picture. This "teaching by the monitor" is especially important when training aids are being presented. It calls for a certain amount of spontaneous, on-the-spot development through manipulation if the informal, unrehearsed presentation of a lesson is to be successful. A glance at the monitor tells an instructor immediately that he is not displaying an object adequately and that a change in the angle of holding must be made. Observation of the way in which experienced television teachers at Ft. Monmouth utilized the studio monitor leads to the conclusion that it is an important guide for informal television instruction.

It is recommended that television instructors be taught the importance of the studio monitor as a teaching guide and that "dry runs" under guidance be made to give practice in object manipulation and display.

j. Display of Objects

It was observed that experienced television instructors when displaying small complicated objects turned them slowly in various directions, changing the angle of viewing, pausing at times for a favorable view, thus duplicating in a sense the examination a trainee would give an object were he examining it in his own hands. During such manipulation the instructor watched the picture he was creating on the screen of the studio monitor, glancing down at the object only occasionally. Only by watching the monitor can the instructor be certain that he is showing the trainee what he wants him to see.

Unless the presentation of training aids such as equipment, models, mock-ups, and other devices is thoroughly rehearsed, a procedure which is not recommended for Army training, each display must be handled in an exploratory manner. The objective is to produce a sufficient variety of views so that the trainee will feel he has become acquainted with the object.

It is recommended that all prospective television instructors be given some opportunity to practice display of objects using television equipment.

k. Use of the Pointer

A pointer can be of very great value in television but its improper use will only result in distraction.

The tip of a pointer should be held against a chart to avoid a nervous wavering. Even in the hands of a person who is not under emotional strain, some movement is likely to occur which on the television screen is extremely noticeable and distracting. It was noted at Ft. Monmouth that instructors on television for the first time were in some cases sufficiently nervous to make the pointer more of a distraction than an aid until told to press the tip against the chart. It was further noted that the beginner did not hold a pointer in a position long enough to be effective, tending merely to tap a spot about which he was talking. Restlessly moving a pointer over a chart or training aid is to be avoided; so is gesturing while holding a pointer in the hands.

Pointers made from cardboard in the shape of arrows with captions printed on them are extremely effective.[1]

A lead pencil makes a convenient pointer to be used with small objects and when used with unfamiliar objects has the advantage of giving the viewer a size comparison.

Experience indicates that beginning television instructors should be given information on the proper use of a pointer.

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[1] The kinescope recording, "Power Supplies, No. 3", on deposit at the Special Devices Center illustrates this technique.

PART II

TELEVISION IN ARMY TRAINING

G. Kinescope Recordings

It is recommended that:

1. Provision be made for the production of kinescope recordings.

2. Kinescope recordings be considered when duplication of lessons is desirable.

3. The rapid dissemination of new developments by means of kinescope recordings be given consideration.

4. The kinescope recording be used as a supplement to technical manuals.

5. The kinescope recording be used in television teacher training.

6. Motion picture films and kinescope recordings be used to supplement each other in television teaching.

G. Kinescope Recordings

A kinescope recording is a film record of a television program as presented on the screen of a television receiver. It serves much the same purpose that a tape recording does in radio.

The probability that many new educational television stations will soon be established, has stimulated interest in the production of kinescope recordings suitable for use by such stations. The Fund for Adult Education (a non-profit organization established by the Ford Foundation) is currently interested in this field. Indications are that educational television will rely heavily upon recordings. If the engineering problems involved in transferring TV electrical impulses to tape are solved and economical operation results, then the use of recorded programs will be further stimulated.

Kinescope recordings, commonly referred to as "kines", are desirable for several reasons: (1) they are an authentic record of a program that was actually presented, (2) they can be studied for the purpose of program improvement, (3) they can be shown as a sound-film wherever an ordinary portable moving picture projector is available, (4) they make it possible to telecast a program any number of times without setting up the original television program, (5) they provide quick dissemination of programs to other places for another telecast or where they can be shown as moving picture film, (6) they make it possible to economically exchange programs as is planned, for example, among educational television stations, and (7) they make it possible to delay a program to be shown at a time more convenient than the time of the original live telecast.

1. Examples of Television Teaching

a. Fort Monmouth

Four kinescope recordings were made with personnel and teaching materials from Ft. Monmouth. These were transported to Special Devices Center where kinescope recording equipment is available.[1]

Three recordings were made of the lesson "Power Supplies." The first recording was a duplication, as nearly as possible, of the lesson as it has been taught in The Signal School with minimum television facilities, that is, a single camera chain. The customary panel of three trainees was used and the only training aid a blackboard.

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[1] All kinescope recordings made for this project are on file at Special Devices Center, Sands Point, Port Washington, Long Island, New York. They may be requested by military personnel for review.

The second recording was the same lesson taught by means of a "bread-board" training aid and with only one camera. This "kine" illustrates the presentation of a simple demonstration by means of television.

The third kinescope recording was more elaborate than either the first or second and was prepared for the purpose of showing what can be done with full studio support. Two cameras were used, sectional flip-card, a small portable radio, "bread-board", and an oscilloscope. A studio panel of trainees was not used.

A fourth kinescope recording was made to illustrate the way in which an instructor must adjust himself to the special requirements of television. An experienced television teacher from Ft. Monmouth served as this instructor; a representative from the Instructor Training Branch, The Signal School, aided in planning the recording. This "kine" can serve as the basis for the development of television teacher-training films.

b. Fort Slocum

Three kinescope recordings were made at Special Devices Center by personnel from the Chaplain School, Ft. Slocum. The subject matter was that taught regularly to chaplains and chaplains' assistants.

Two recordings, each by a single instructor, were made on the subjects of "Use of the Voice" and "The Moral Nature of Man". Only simple training aids, blackboard, flannel-graph, and magnetic board were used.

A third recording was made by a panel of three chaplains and a fourth acting as moderator, who developed the subject of "Character Building" through an informal, planned discussion. Again, only simple training aids were used and in none of the recordings was a student panel or student class used. The presentations were all made directly to the camera.

c. Aberdeen Proving Ground

Some of the activities of Mobile Television System[1], Signal Corps, were put on record by means of portable kinescope recording equipment[2] taken to Aberdeen Proving Ground where Mobile Television System is taking part in the courses on Preventive Maintenance.

Dramatic sketches and demonstrations presented by personnel of the Mobile Television System were recorded. The most elaborate was a kinescope recording of a planned demonstration of conducting a class by the "Case Study Method." Approximately twenty selected individuals constituted the "class", there was informal discussion of a prepared "case" and the recording was made after rehearsal.

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[1] For a description of Mobile Television System and its activities see Exhibit B, Appendix.

[2] See discussion on Mobile Television System, pages 43 and 44.

d. Iowa State College

Since the acquisition of kinescope recording equipment[1] in January, 1952, most of the locally produced educational and informational programs of WOI-TV have been recorded. Footage has reached a production rate of about 200,000 per year.

None of the programs has been on subject matter for which college credit has been given. However, an approach to a "class" situation was made when a series of lessons on "Make a Dress" were telecast and several thousand women in central Iowa, the territory served by WOI-TV, wrote for printed reading materials designed to supplement their televiewing. This was probably a relatively constant audience.

A number of informational programs, sometimes of interest to specialized groups, have been telecast. In these there has been considerable experimentation with visual aids, lighting, and manner of presentation.

Attitudinal programs were given considerable attention in a series developed under the title "The Whole Town's Talking" and telecast during the spring of 1952.[2] These programs initially concerned with school reorganization were designed to arouse interest in community problems and their solution at the local level. Other community problems considered were community chests, hospitals, and building a county court house. A program of importance both to the individual family and the community was devoted to the question of selective service. The kinescope recording of this program has received wide circulation. Surveys planned by the Statistical Laboratory, Iowa State College, were a part of the study.

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[1] This is complete equipment (General Precision Laboratory) including a unit for the rapid processing of film.

[2] These programs were developed under a grant from the Fund for Adult Education, established by the Ford Foundation.

2. Educational Evaluation of Selected Recordings

The three kinescope recordings on "Power Supplies" (Radio Electronics, Part I) were shown to eight instructors in the Instructor Training Branch, The Signal School, Fort Monmouth. These recordings were chosen because they present the same lesson with three different training aid treatments varying from simple to elaborate. The instructors were asked to make comparative judgments on (1) attention, (2) interest, (3) clarity, (4) student desire to learn, (5) visual elements, (6) rate of presenting ideas, (7) distractions, (8) camera on essentials, (9) efficient use of time, (10) range of appeal, and (11) an over-all, general evaluation. A copy of the evaluation will be found in the Appendix as Exhibit C.

Recordings #2 and #3 making use of mechanical demonstrational aids were favored over the simplest #1, using only a blackboard and a studio student panel. Kine #3 with the strongest training aid support, was preferred in eight of the eleven characteristics to be judged. But it is to be noted that kine #2 making use of a simple training aid did receive some instructor choices. The degree to which a lesson should be training aid supported for best results in class marks, student satisfaction, and efficiency in the field might well be made the object of special investigation.

Kinescope recording #3, "Power Supplies", was shown to a class of Navy reserve officers at Iowa State College along with the kinescope recording Drill Call #33, "Organization of the Navy". Although both recordings were considered interesting and informative by the group, it was suggested that #3 has a psychological advantage because "the instructor is talking to me!" In Drill Call #33, the setting is that of an instructor talking to a class and was felt to be a little less direct.

An interesting and significant investigation was conducted recently by Special Devices Center using Airmen as subjects stationed at Mitchell Air Force Base, Garden City, New York.[1] Classes thinking they were seeing kinescope recordings (actual kines or training films) received higher test marks than classes thinking they were seeing standard training films (kines or training films). Three possible explanations were offered: (1) novelty effect (newness stimulated interest), (2) immediacy (impression of happening now), and (3) culture (TV represents progress and an acceptable direction of change).

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[1] Jackson, Robert. Learning from Kinescopes and Films. SDC Human Engineering Project 20-TV-1. April 1952. Special Devices Center, Port Washington, L.I., New York.

In another Special Devices Center project,[1] involving the training of Naval Air Reservists, kinescope recordings were found to be almost as good as live television; equal in 94% and inferior in 6% of the comparisons for officers, and equal in 73% and inferior in 27% for enlisted men.

3. Dissemination of Television Lessons

By using standard processing equipment, the film record of a 30 minute television lesson can be made available within approximately 90 minutes after it has been photographically recorded. If a film negative is made, an indefinite number of positives for general distribution can be produced by contact printing. Equipment is now on the market which processes film continuously at the time a kinescope record is being made. Within a minute after the close of the program the kinescope recording is ready for use.

The speed with which kinescope recordings can be made makes possible the rapid dissemination of new developments. Because the nonprofessional, unpolished atmosphere of television (and of the kinescope recording) is accepted as realistic, a situation can be presented with a minimum of rehearsing. A new development can be presented without special staging. An unusually effective lesson taught by a particularly competent instructor can be realistically recorded and made available to other Army posts, camps, and stations. Such a lesson can be utilized as a television presentation and also may serve the purpose of a pattern for better lessons.

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[1] Rock, R. T., Duva, J. S., and Murray, J. E. "Training by Television. The Comparative Effectiveness of Instruction by Television, Television Recordings, and Conventional Classroom Procedures". Special Devices Center, Office of Naval Research, Department of the Navy, Port Washington, L. I., N.Y. SDC Report 476-02-2, NAVEXOS P-850-2. (Not dated)

The kinescope recording may be useful as a supplement to technical manuals. Already a beginning has been made by Special Devices Center in producing a kinescope recording as an aid in assembling the 40-mm. antiaircraft gunnery trainer.[1] It is reported that the trainer is now being quickly and successfully installed by the use of kine and manual whereas formerly with only the manual considerable failure was encountered.

Film supplements to technical manuals may be either motion pictures or kinescope recordings. If for any reason the usual motion picture facilities are not available, consideration should be given television filming. With two methods available for producing the same results, a choice can be made according to circumstances which at the time favor one or the other. Kinescope recordings, then, introduce an element of flexibility in the production of technical manual film supplements.

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[1] Special Devices Center. "Installation of 40-mm. Dual Projector Gunnery Trainer, Device 3-D-14-K." Project 16-M-3, Catalog No. AGT-8, Special Devices Center, Port Washington, L.I., New York.

4. Kinescope Recording vs. Motion Picture Film

It is not the purpose of this report to argue the merits of kinescope recordings as opposed to those of motion picture film. Actually, the two are similar and in a television teaching situation can be considered complementary. As has been previously indicated, training films can be shown on the television receiver screen if the proper projection equipment is available at the television studio. Motion picture camera technicians at Iowa State College in producing film for use on WOI-TV have found that attention to contrast ratios, deviating from the usual motion picture standards, results in improved television pictures. There is no reason why the motion picture camera should not act as a "feeder" for television. It is not proposed that all showing of motion picture films would end with the introduction of television.

It is recognized that in general the quality of kinescope recordings is inferior to that of live telecasts, and regular motion picture film is usually subject to some degradation when used on television. However, it would seem that this need not always be the case. Some commercial kinescope recordings and motion picture films are remarkably close to live telecasts indicating that better controls are being developed. Technicians at WOI-TV report considerably improved kinescope recordings as a result of study and experience. With improvement in quality, the kine along with the motion picture film may find considerable use in teaching by television.

5. Army Recommendation of Kinescope Recordings

Kinescope recordings recommended by the Army and now available for use are listed in the publication "Motion Picture and Photographic Services".[1] It is not necessary for any Army post, camp, or station to wait for the installation of television before using kinescope recordings because they can be shown as regular motion pictures in the usual way by means of standard motion picture projection equipment.

It is suggested that in the event of increased use of television for Army training, consideration be given the production of kinescope recordings. Possibly some form of centralized service could be set up to lower production costs.

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[1] Army, (Department of). "Motion Picture and Photographic Services. Index of Army Motion Pictures, Kinescope Recordings, and Film Strips." SR 110-1-1 (Restricted), October 1951.

PART III

CONCLUSIONS

Television in Army Training
(Part II)

Criteria for Selection of Lessons
(Section A)

It is concluded that:

1. A criteria check-list will help in the objective selection of subjects for presentation on television in the consideration of all aspects of the subject matter.

2. A weighted check-list for a single score is not feasible.

3. The criteria check-list (Appendix A) is a workable list, but further experimentation and observation may improve it.

4. A committee of three officers who are intimately acquainted with the training schedule and the training situation of the unit, whose members will view the subjects selected for presentation on television can best make use of the criteria check-list.

5. The final choice of Army subjects may involve a number of factors, some administrative, but the local command can best indicate which specific subjects can be most advantageously televised.

6. Higher command of each branch of the service can aid lower echelons by providing a general criteria check-list.

Television in Army Training
(Part II)

Utilization of Television in Army Teaching
(Section B)

It is concluded that:

1. Not more than twenty students should view one television receiver screen.

2. Not more than four hours per day of the total curriculum should be devoted to presenting subjects on television; continuous viewing of the screen should not exceed thirty minutes.

3. Television presentation can be integrated into the curriculum; alterations in scheduling and in subject matter should be kept to a minimum.

4. The best instruction is informal and extemporaneous.

5. The best instructional situation is instructor-dominated, even to the extent of the instructor directing the cameraman.

6. Television makes the best instructor available for universal teaching, thereby, standardizing instruction at a high level.

7. Since class discussion is often desirable, a panel of three men in the studio may provide a substitute. The decision to use an intercommunicating system should be determined by local command.

8. Achievement testing is desirable; the type of testing usually employed is satisfactory.

9. Special instructors for television (actors, for instance) are not required. The average instructor who is thoroughly familiar with his subject matter, experienced in teaching procedures, who can carry out movements with due regard for the limitations of television, and who learns to observe the studio monitor while teaching can become a successful television teacher.

10. Actual demonstrations supported by visual aids can be successfully presented on television.

11. Both military and civilian attitudinal programs have been successfully televised. A suitable addition to production technique is the staged presentation for dramatic effect.

12. The successful televising of tactical demonstrations in the field suggests its use under combat conditions.

Television in Army Training
(Part II)

Training Aids
(Section C)

It is concluded that:

1. Fine line charts, such as schematics, printed in black on white are more effective than those printed in white on black.

2. Charts using heavy lines should contain gray lines in one of four or five shades on a medium-brown background rather than white on black. Proper gray values must be determined by practical test.

3. Flannel-graphs and magnetic boards are admirably adapted for use in television.

4. Sectional flip-cards are useful in televising.

5. Substitutes for soft white chalk on blackboards reveal no worthwhile advantage. Yellow chalk on a green board is very acceptable.

6. Magnification of models, mock-ups, cut-aways, training boards and similar equipment is possible on television, making it unnecessary for these aids to be constructed as large as they would have to be for classroom teaching. They cannot be simplified, however, and in some instances television may increase their complexity. In rare cases, color may eliminate the use of some aids on television; other aids may have to be re-painted or re-colored before they can be acceptably photographed.

Television in Army Training
(Part II)

Television Equipment
(Section D)

It is concluded that:

1. Although overhead, lapel and pencil microphones are all satisfactory, the lapel microphone is best for educational television.

2. Successful television teaching can be done with one camera. Two are better.

3. A carefully placed studio monitor is essential to effective instruction.

4. Flat fluorescent lighting is generally satisfactory, although incandescent flood lights are an aid to studio lighting in certain situations. Yellow fluorescent lights are of no noticeable advantage.

5. Television viewing needs no special lighting or darkening of the classroom. Glare on the receiver screen needs to be guarded against.

6. The usual television receiver is satisfactory.

7. A receiver screen size of sixteen inches is minimum, nineteen or larger preferred to accommodate twenty viewers.

8. In mass, large scale Army training by television, intercommunication simultaneous with telecasting will be difficult but opportunity for questions and discussion in later non-TV class periods will serve as a substitute.

9. Although mechanically more elaborate dollies are in use, the standard tripod dolly gives satisfactory service.

10. "Burning-in" (picture persistence) is distracting to the viewer: it should be kept to a minimum and may be avoided by switching cameras and using low-contrast light ratios.

11. Card stands, holders, equipment for films, film strips and slides are indispensable.

12. Equipment for making kinescope recordings is useful but expensive.

13. Open circuit equipment is useful, but for security reasons and because of technical complexities is not always practicable. A closed-circuit is the more feasible of the two systems.

Television in Army Training
(Part II)

Television Operational Techniques
(Section E)

It is concluded that:

1. A rapid rate of writing or drawing on a blackboard can be distracting to the viewer.

2. Television can enlarge objects to aid the learning process.

3. Superimpositions can be used to show relationships.

4. "Fades" and "dissolves" are dramatically useful but otherwise serve only for variety.

5. "Panning" is especially helpful in giving an overall, related picture of the television setting.

6. Over-the-shoulder (subjective) shots are an aid to learning.

7. "Noisy" (complex settings are distracting; "quiet" (simple) settings enable the viewer to fix his attention upon significant features.

8. With the single-camera chain the instructor dominates. The two-camera chain calls for a close working relationship between instructor and director, but the instructor knows best what should be taught and therefore should still exert the greater directive influence when presenting a lesson.

Television in Army Training
(Part II)

Selection and Training of Television Instructors
(Section F)

It is concluded that:

1. Student panels in a studio are useful to new instructors in effecting the transition from classroom to studio.

2. A deliberate rate of speaking is desirable. It is necessary that words be clearly and properly enunciated.

3. Deliberate movements by the instructor are mandatory. Unnecessary movements are distracting. Rapid movements toward or away from the camera by the instructor result in the deterioration of the television picture; the instructor must learn to reduce the number of such movements and to give the cameraman opportunity to follow him when they are made.

4. A pointer can be of very great value in television, but its improper use will only result in distraction.

5. Instructors must understand the technique of camera eye-contact and the necessity for it.

6. Presentation of objects when demonstrating must be rehearsed by the instructor.

7. The studio monitor is an important guide for informal television instruction.

8. "Dry-runs" are essential, preferably with kine recordings.

Television in Army Training
(Part II)

Kinescope Recordings
(Section G)

It is concluded that:

1. Kinescope recordings make it possible to later review and criticize a lesson.

2. Kinescope recordings can be used for television teacher training.

3. Because of the rapid processing of film, almost immediate distribution of television recordings can be made.

4. New developments can be given wide dissemination.

5. The kinescope recording can be a useful supplement to a technical manual.

6. Because of similarity in use, kinescope recordings and motion picture films should be considered complementary to each other, not competitive.

7. With the installation of television, production of kinescope recordings should be given serious consideration.

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Exhibit A

1. IS THE INSTRUCTION PRIMARILY (1) PRESENTATION-DEMONSTRATION OR (2) APPLICATION?

Explanation: It is a well-known principle in army training that presentation and demonstration are followed by application which is the phase of the instructional situation wherein the trainee learns by doing. Because of this separation into steps of phases, it is possible to classify a specific learning situation as essentially presentation-demonstration or as essentially application (performance), depending upon the subject matter and the stage of the training.

Examples: Presentation-demonstration - "organization of the army" - details of how the army is organized are given but this training is best characterized as "presentation" and is not followed by physical application.

Application - "practice in making sling adjustments in rifle marksmanship" - actual activity; trainee learns by doing; he personally makes the adjustments following a demonstration and explanation.

Question: Is the specifically named situation concerned primarily with presentation-demonstration or application?

1. Presentation-demonstration - subject matter is presented and demonstrated to trainees but at this stage they do not themselves engage in the activity. They listen and watch.

2. Application - subject matter is applied; the "doing" phase of the training; trainees actually participate (after presentation and demonstration). They develop skill by doing.

Exhibit A

2. IS ORAL INTERCOMMUNICATION BETWEEN INSTRUCTOR AND STUDENTS VITAL?

Explanation: In some instructional situations, the subject is one that requires the asking and answering of questions during instruction, or that depends in large part upon the personal relationship of student-instructor for success. Sometimes abstract ideas are involved so that opportunity for questions must be given if good understanding is to result. In other situations, questioning is not used or may even be undesirable.

Examples: Little or no intercommunication - "address by camp commander" - a lecture, often for purposes of morale, and questioning is not used.

Questions and answers indispensable - "customs of the army" - opportunity to ask questions is necessary in order to clear up perplexing situations or to supply desired information.

Question: Is there a great need for oral intercommunication between instructor and student or is it relatively unimportant or even perhaps unnecessary?

1. Little or no intercommunication - questions and answers used but little, if at all. Intercommunication difficult for some reason or perhaps not considered necessary.

2. Questions and answers indispensable - opportunity for trainees to ask questions a necessity. Sometimes the objective may be a closer student-instructor relationship, aiming at a highly personalized situation.

Exhibit A

3. IS THERE A NEED FOR RAPID AND EARLY DISSEMINATION OF INFORMATION?

Explanation: Upon occasion it is desirable to give the same information to a large number of men at one time, even perhaps at the same hour on the same day of the week. This is especially true in basic training where it is sometimes desirable to give certain explanations and demonstrations to all men as early as possible. Sometimes it may be highly desirable, if not urgent, that every man learn about the latest development concerning a new mechanism or a new procedure just as soon as possible. On the other hand, there are instructional subjects (especially in advanced specialties) where the time element may be less important so that men in the same unit may be taught the same subject matter several weeks apart without seriously interfering with efficiency.

Examples: Rapid dissemination very desirable - "wearing ofthe uniform" - it would be highly desirable for all recruits to learn early the necessity of always being in proper uniform.

Rapid dissemination not urgent - "preparation of salads for mess halls" - any new method of making salads more palatable or preparing them in less time may be quite desirable but the rapid dissemination of such a new development would probably not be considered of high military urgency.

Question: In this particular situation, is the rapid and early dissemination of information highly desirable or is the pressure of time not an important factor?

1. Rapid dissemination very desirable - highly desirable that information be given to the men early in the training schedule, or that large numbers be reached more or less simultaneously, or that subject matter concerned with new developments be rapidly disseminated.

2. Rapid dissemination not urgent - pressure of time is not felt too greatly; not considered urgent that many men be reached quickly.

Exhibit A

4. IS THE NUMBER OF TRAINED INSTRUCTORS LIMITED BY THE DIFFICULTY OF THE SUBJECT?

Explanation: Consider the difficulty and complexity of the instructional subject. This will range all the way from easy to most difficult. The one extreme would involve educational material so easy that almost anyone who has been through it should be able to show or tell the other fellow how to do it. (For that reason teaching personnel will always be readily available.) The other extreme-most difficult-would be instructional subjects so difficult that only men with good ability, good education, and much specialized army training can learn to be qualified (acceptable) instructors. (For this reason teaching personnel for these instructional units may often be lacking.)

Examples: Few trained instructors available - "theory of anti-aircraft gunnery" - requires an extremely capable man, well trained, to teach this. Therefore, only a few trained instructors are usually available.

Many instructors available - "personal hygiene" - any man capable of becoming a soldier will be able to tell others about the elementary principles of personal cleanliness.

Question. Is there likely to be a lack of trained instructors due to the difficulty of the subject?

1. Few trained instructors available - subject matter is so difficult that it requires a very capable instructor with a good educational background, college or equivalent, in addition to considerable specialized army training.

2. Many instructors available - subject not difficult; any officer should be capable of teaching it.

Exhibit A

5. IS THE INSTRUCTIONAL SITUATION DANGEROUS?

Explanation: Some instructional situations involve an element of danger, both to students and the instructor. This is especially true in the case of new recruits who are for the first time being introduced to certain types of weapons, equipment and materiel with which they are unfamiliar. Even when the instructor handles the dangerous mechanisms or materiel himself, there may still be the possibility of serious injury resulting from an error. Other situations may involve almost no risk to personnel regardless of stage of training.

Examples: Dangerous - "hand grenades" - definite precautions must be taken and this information should be given before the live grenades are handled.

Little or no danger - "organization of the army" - nothing dangerous to life or limb is involved.

Question: What degree of danger is involved in the instructional situation?

1. Dangerous - involves an element of danger, especially to untrained personnel, so that safety measures must be emphasized.
2. Little or no danger - no danger or at least not any more than would be involved in a normal day's activity as a civilian.

Exhibit A

6. HOW PLENTIFUL IS THE SUPPLY OF TRAINING AIDS?

Explanation: Consider whether or not there are usually enough training aids available for the particular subject to be taught. Think of training aids in a broad sense, not only including mock-ups, models, charts, diagrams, etc., but equipment, materiel, and even demonstrational personnel. In some cases, all the training aids that are needed are readily available and supply is no particular problem. In other cases, a sufficient quantity may not usually be available because the aids are too costly for general distribution, too difficult to have the training aids made up, too easily broken or damaged and therefore not usable, or for any other reason which would tend toward scarcity.

Examples: Limited supply - "aerial cameras" - costly; supply too limited to allow more than just a few men at a time to see them.

Plentiful supply - "rifles" - these are usually readily available so that every man can have one in his hands. Supply sufficient for almost any number of men.

Question: How plentiful is the supply of training aids and demonstrational equipment?

1. Limited supply - supply sharply limited. More would often be desirable but seldom is enough available.
2. Plentiful supply - usually available in quantity, almost to the extent of one per student or at least for a number of student groups.

Exhibit A

7. ARE THE TRAINING AIDS READILY MOVABLE?

Explanation: Transporting or moving training aids is often a problem. Small charts or light equipment can easily be moved. Large charts, heavy mock-ups, and unwieldy models may require trucks and a number of men to transport them. Mobility of equipment frequently needs to be considered when it is desired to give a demonstration.

Examples: Difficult to move - "field water purification" - where it is desired to acquaint large numbers of men, who will not be sanitation experts, with the principles of chemical and mechanical purification of water in the field. Equipment not easily moved about; may not even be possible to take equipment to the place where the men are.

Easy to move - "tying knots" - charts and pieces of rope to supply each man can easily be transported.

Question: How easily can training aids, including demonstrational equipment, be moved or transported?

1. Difficult to move - training aids and demonstrational equipment are so large or heavy and unwieldy that moving or transporting them becomes a problem.
2. Easy to move - training aids, demonstrational equipment, and educational materials can be moved about or transported almost at will. Movability to be considered little or no problem.

Exhibit A

8. MUST THE TRAINING AIDS BE OBSERVED AT CLOSE RANGE?

Explanation: Many weapons and instruments and much materiel must be viewed by trainees at close range for proper instruction and expecially for proper understanding of the inner workings. For this reason, only a few men at a time, perhaps even one at a time, will have access to the situation. In some situations, however, a close-up is not used. Sometimes the training aid or the equipment is large enough so that a whole class has no difficulty in following the demonstration and there is no necessity for close-up observation.

Examples: Close-up very desirable - "multi-gear shift of a large-type truck" - can be viewed by only a very small number of men because of confined space in the cab and they must be close-up to receive any benefit at all from the demonstration.

Close-up not necessary - "observation of scouting and patrolling" - a group of trainees sitting on a hillside observing the movements of scouts passing through various kinds of terrain. A general panoramic effect is desirable.

Question: Is close-up observation necessary for adequate learning?

1. Close-up very desirable - whatever is being shown is small, or it is a small part of a large piece, or it is in a confined or darkened space, or its workings cannot easily be viewed because of the operator's actions and for this reason can be observed by a very few men or even only by one man at a time.

2. Close-up not necessary - distance away not an important factor. If observation is necessary, will be easily visible to the whole class.

Exhibit A

9. IS COLOR A NECESSARY ELEMENT IN THE INSTRUCTION?

Explanation: Some training aids and instructional materials may depend to a large extent upon the use of color for their understanding by students. Important differentiations may have to be made in terms of variations in color as, for example, in identifying the parts of a training aid by naming the colors. On the other hand, color is sometimes used merely for decoration, to add interest, or to make a situation more realistic (as in the case of a picture) but does not actually greatly enhance the learning process. In this case, understanding or identification does not depend upon color and the lesson could be taught just as well were the training aids and instructional materials shown in black, white, and contrasting shades of gray.

Examples: Color not important - "interior guard duty" - the functions and responsibility of a man while on guard duty can be explained without the use of color.

Color a necessary element - "rocket signals" - the meaning of a signal will depend upon the color and unless colors are correctly perceived, the proper response cannot be made. For example, a green rocket may be assigned the meaning "send reinforcements"; red, "lift the barrage", etc. The signifance of the rocket depends upon the color used.

Question: Is the use of color necessary in the instructional situation?

1. Color not important - color may not be used at all, or, if used, may be only for decoration; understanding the instruction does not depend particularly upon the identification of colors.

2. Color a necessary element - important information conveyed by the use of color; training aids will not be properly understood without close attention to the colors; use of colors necessary when explanations are given.

Exhibit A

10. IS AN AUDIO-VISUAL RECORD OF THE INSTRUCTIONAL SUBJECT DESIRABLE?

Explanation: At times it may be desirable to make an audio-visual record of a particular subject as it is actually being taught. Such a record may be wanted for various reasons among which may be mentioned: (1) to save time when the subject is to be repeated but initially requires considerable equipment and physical preparation for presenting the instruction; (2) when clear-cut evidence should be available on what was actually said or done as in the case of a court-martial involving security violation; and (3) instruction which needs to be repeated exactly to another group at another time or place and it is desired that there should be a strict adherence to proper sequence as in the case of safety rules.

Examples: Record highly desirable - "enemy placement of booby traps" - since it takes considerable time and equipment to set up actual situations to show how the enemy places booby traps, the demonstration can be photographically recorded and then shown as often as desired with a great saving in time.

Record not desired - "I. and E. news discussions" - not probable that an audio-visual record would be desired.

Question: Would it be highly desirable to have an audio-visual record of the instructional subject?

1. Record highly desirable - for any one of a number of reasons an audio-visual record of the subject matter might be useful at some future time.

2. Record not desired - not probable that an audio-visual record of the subject matter would be of any particular use at a future time; may be too much trouble or too difficult to get a record; cost of making a record may be too great.

Exhibit A

11. IS IT NECESSARY TO TRANSPORT THE MEN FOR INSTRUCTION?

Explanation: Instruction in the subject requires that students move from one area to another, the areas at times being widely separated. Sometimes it may be necessary to transport the men quite some distance from camp. This results in a loss of time which could have been used for instruction. In contrast with this, some types of instruction can be given in the mess halls, in the barracks, or in buildings so close by that the men can walk to them in a few minutes.

Examples: Much transportation required - "demonstrating the gun position and the observation post of heavy artillery" - large groups of men would need to be moved by trucks from one installation to another.

No transportation required - "articles of war" - may be given any place that the men can be conveniently assembled. Minimum loss of time in moving from one place to another.

Question: Is it necessary to transport or move men with a consequent loss in time that might have been devoted to instruction?

1. Much transportation required - instruction requires that men change from one area to another by vehicles or that perhaps an hour or more is needed to go by foot.

2. Very little movement - instruction takes place entirely in one area where little or no moving about is required.

Exhibit A

12. TO WHAT EXTENT DOES WEATHER AFFECT THE INSTRUCTION?

Explanation: Rain or snow may limit the value of certain instruction or may even entirely prevent it when the instruction must take place out of doors. This would be particularly true in the case of large scale instruction (many groups) so that adequate protection against weather cannot be provided. When trainees experience extreme discomfort due to adverse weather, there may be a marked lowering of efficiency and morale. On the other hand, some instructional situations are carried on indoors or when conducted outdoors, adequate shielding against weather can be provided.

We are not here concerned with training that is deliberately carried out in bad weather in order to teach proper military operation under adverse conditions. It is recognized that trainees must at times be subjected to foul weather in order to learn to cope with the problems of combat under such conditions.

Examples: Adverse weather lowers instructional efficiency - "practical demonstration of artillery battalion RSOP (Reconnaissance, Selection, and Occupation of Position)" - large numbers of men would be involved both in the demonstration and the observation; rain or snow would interfere with visibility as well as efficiency of movement; impossible to provide adequate protection against weather; learning may be lowered because of personal discomfort.

Weather not a factor - "explanation of principles of leadership" - all instruction can be indoors.

Question: Does adverse weather hinder the effectiveness of instruction?

1. Adverse weather lowers instructional efficiency - instruction must take place out of doors perhaps with large groups of men so that adequate protection against bad weather cannot be provided.

2. Weather not a factor - instruction takes place indoors, or if outdoors, in small groups or under conditions such that protection against bad weather can readily be provided.

Exhibit A

13. WHAT IS THE SECURITY CLASSIFICATION OF THE INSTRUCTIONAL MATERIALS?

Explanation: Most instructional material (lessons plans, schedules, procedures) will have a security classification of "restricted". A few situations will be "confidential" or higher.

Examples: Unclassified or restricted - "use and care of aiming circle" - restricted.

Confidential or higher - "newer details of jet aircraft" - high security classification, depending upon the specific detail.

Question: What security classification does the instructional material have?

1. Unclassified or restricted

2. Confidential or higher

Exhibit B.

This description of TV activities carried on by Mobile Television System at Aberdeen Proving Ground is included by permission of Special Devices Center

From: Code 600TV 29 April 1952 600TV:EGS
To: Code 600

Subj: Training by Television at the Ordnance School, Aberdeen Proving Ground, Maryland

Encl:
(1) Army Field Force Commanders Preventive Maintenance Course, Aberdeen Proving Ground, Md., Schedule for Course Preview
(2) Sequel to Presentation I, "Effective PM in Combat" TV Working Script, 1 Mar 1952
(3) Revised TV Working Script
(4) Photograph of "Opening Shot of Transportation PM Presentation"
(5) Photograph of "PM of Diesel-Electric Locomotive"
(6) Photograph of "Engineer PM Presentation"
(7) Photograph of "Signal Corps PM Presentation"
(8) Photograph of "Quartermaster PM Presentation"
(9) Photograph of "PM Exhibition"
(10) Signal Corps Mobile Television System TV Questionnaire
(11) Video War Room - A Portrayal of Tactical Television As It May Function in the Future - 31 Mar 1952

1. The writer, in the company of Dr. Martin Fritz, of Iowa State College, visited the First Signal Corps Mobile Television System at Aberdeen Proving Ground on 3 April 1952.

2. General: The First Mobile Television System is presently engaged in the following activities:

a. Production of TV training presentations and demonstrations for the Army Field Forces Commanders' Preventive Maintenance Course at The Ordnance School.

b. Production of "Video War Room", a weekly demonstration on the applications of TV to tactical situations.

c. Other activities as directed.

3. First Mobile Television System: This is a completely mobile TV unit, capable of independent operation in the field or on a post.

a. Equipment:

(1) Pickup: This consists essentially of three commercial-type TV cameras and one film chain. The equipment is housed in a pickup van, and has an accompanying power van.

Exhibit B

Subj: Training by Television at the Ordnance School, Aberdeen
Proving Ground, Maryland

(2) Reception: This consists of ten 16" direct-view TV receivers and one projection receiver capable of producing a picture 6' x 8'. These are fed from a receiver van, which has an accompanying power van. There is sufficient cable to allow the receivers to operate up to one hundred feet from the van.

(3) Distribution: The pickup van feeds its signal to the reception van by microwave relay. The two vans may be separated by a distance up to 20 miles depending on terrain.

(4) Transportation: Total transportation consists of four vans, two 2-1/2 ton trucks, two 1/2 ton trucks, two sedans, and one jeep.

b. Personnel: Present strength of the unit is 6 officers, 1 warrant officer, and 27 enlisted men. All are specially selected for their previous experience in commercial television.

4. Preventive Maintenance Course:

a. Purpose: The Preventive Maintenance Course is for Division, Corps, and Army commanders and their senior officers. It is aimed at impressing them with the importance of preventive maintenance, and to show how to supervise it in their own units. Classes are about 25 in size. The course lasts four days.

b. Mobile System Participation: The participation of the mobile system consists of television dramatizations and demonstrations integrated into the overall course (See Enclosure (1)). These presentations total about two hours of time. They are produced by the Mobile System personnel, and participants are from the PM Course. The presentations are in two categories:

(1) Introductory: There are two introductory presentations, each of about fifteen minutes duration. They demonstrate what happens in units with and without good preventive maintenance. Their purpose is to motivate the students, and to show them the importance of the course. (See enclosure (2))

(2) Dramatizations and Demonstrations: There are about five of these, averaging from 15 to 30 minutes in length. They show proper PM techniques for the various types of equipment in the Transportation Corps, Signal Corps, Quartermaster Corps, Engineers, and Ordnance. (See enclosure (3) through (8))

c. Physical Layout: Presentations originate from three different points. They are all fed to a central classroom which uses the 6' x 8' picture of the projection receiver. Pickup points are:

Exhibit B

(1) Studio: A stage of a post theatre immediately adjacent to the classroom has been adapted to provide a studio. Flats for sets were obtained from the local Special Services Officer, and repainted. A canvas backdrop is also used.

(2) PM Exhibition: A large hall full of all types of equipment involved in the PM course is also used for origination of preentations. (See enclosure (9)).

(3) Remote: One remote pickup is done from a railroad track about five hundred yards from the classroom. The subject is Preventive Maintenance for a Diesel-Electric Locomotive.

d. Evaluation: A limited amount of evaluation is being done through the use of a simple questionnaire. No results are yet available. (See enclosure (10))

5. "Video War Room" Demonstration: This presentation portrays tactical television as it might function in the future at a Division level. It allows students to see how a Division commander could keep in contact with the tactical situation through the use of TV cameras in the Regimental Command Posts, and at critical points in the forward areas. (See enclosure (11))

6. Other Activities:

a. Infra-Red Test: A test of a TV pickup using a camera with an infra-red sensitive tube has been tried on a limited basis. The tube was the old 23P, an obsolescent image orthicon tube. The light source was the infra-red light from an Army Snooperscope. Fair results were obtained. Possible uses include applications in tactical and instructional TV.

b. Observation of Targets: One test has been made using TV cameras for close-up observation of targets being fired upon by high velocity weapons. A telescopic lens was used. Test was not too satisfactory due to obscuring of target by fog.

/s/ E. G. Sherburne, Jr.

E. G. SHERBURNE, JR.
Television Coordinator

Exhibit C

EDUCATIONAL EVALUATION OF KINESCOPE RECORDINGS

1. Attention
   Which one best captures attention of the students?. . 1__ 2__ 3__

2. Interest (holding power)
   Which one would be more interesting to students?. . . 1__ 2__ 3__

3. Clarity
   Which one makes the ideas clearest? . . . . 1__ 2__ 3__

4. Student Desire to Learn
   Which one is best in stimulating the desire to learn? 1__ 2__ 3__

5. Visual Elements
   Which one makes best use of visual learning?. . . . . 1__ 2__ 3__

6. Rate of Presenting Ideas
   Which one has best timing in presenting ideas?. . . . 1__ 2__ 3__

7. Distractions
   Which one has fewest distractions?. . . . . 1__ 2__ 3__

8. Camera on Essentials
   Which one shows best direction of camera on essentials?1__ 2__ 3__

9. Efficient Use of Time
   Which one is most economical in use of time? . . . . 1__ 2__ 3__

10. Range of Appeal
    Which would appeal best to a class having a wide range
    of ability? . . . . 1__ 2__ 3__

General Evaluation: Which one do you consider the best

"packaged" and the one you would select for use?. . . 1 2 3

Comments:

Name________________________ Date_________ Military_____ Civilian____

Military Post or Camp______________________

Have you had experience teaching by means of television? Yes___ No_____

Have you had teaching experience in which you made use

of films? Yes____ No____

Do you see some television almost daily? Yes____ No____

Exhibit C..

Summary of Kinescope evaluations on "Power Supplies", Radio Electronics, Part I, The Signal School, Ft. Monmouth, eight instructors participating from the Instructor Training Branch.

Numbers in parentheses indicate the number of instructors showing a preference for a particular kinescope recording.

EDUCATIONAL EVALUATION OF KINESCOPE RECORDINGS

1. Attention . . . . 1____ 2(6) 3(2)
2. Interest (holding power). . . . . 1____ 2(6) 3(2)
3. Clarity . . . . 1____ 2(2) 3(6)
4. Student Desire to Learn . . . . 1____ 2(5) 3(3)
5. Visual Elements . . . . 1____ 2(2) 3(6)
6. Rate of Presenting Ideas . . . (1)?. . . . 1____ 2(2) 3(5)
7. Distractions . . . . 1(1) 2(2) 3(5)
8. Camera on Essentials . . . . 1____ 2____ 3(8)
9. Efficient Use of Time . . . . . (1)?. . . . 1(1) 2(1) 3(5)
10. Range of Appeal . . . . 1(1) 2(1) 3(6)

General Evaluation: Which one do you consider the best "packaged" presentation and the one you would select for use? . . . . 1____ 2(3) 3(5)

Have you had experience teaching by means of television? . . . . Yes____ No(8)

Have you had teaching experience in which you made use of films? . . . . Yes(7) No(1)

Do you see some television almost daily?. . Yes(6) No(2)

(Kine #1 is a blackboard presentation, #2 makes use of a relatively simple "breadboard" training aid, and #3 makes strong use of a variety of training aids. All deal with the same lesson.)

FUNDAMANTALS OF
TRAINING BY TELEVISION

MARCH 1952

PREFACE

A survey of the available information in the field of television indicates that the medium can make an effective contribution to training. This report is intended to serve as an introduction to those who are interested in its possible use.

The conclusions which are presented here should not be construed as an overall recommendation for television in every training situation. Television should be used only when it is the "best" of available methods of training.

As television is developing rapidly, portions of this report may become obsolete in a short period of time. Data should be checked carefully before making any decisions based upon it.

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INTRODUCTION:

A. This report describes the present status of the development of television for military training purposes. It takes into consideration trends exhibited by commercial, industrial and educational television as well as military television. It does exclude, however, the production of motion picture film through the use of television equipment. This is considered to be a field separate from television, and more allied to training film. It will be considered in a separate report.

B. Conclusions are based on:

(1) Experimental evidence and experience of the Special Devices Center and other military television projects.

(2) Experimental evidence and experience of commercial, industrial, and educational television.

(3) Experimental evidence from The Pennsylvania State College and other film research projects, which is applicable to television.

CAN TELEVISION PROVIDE EFFECTIVE TRAINING?

A. Television can provide effective training. Experimental evidence has shown:

(1) Live television used as an aid by a classroom instructor provided training equal to or better than face-to-face instruction in a majority of the cases tested.

(2) Live television used as an instructor substitute provided effective training.

(3) All types of trainees (officers and enlisted men) learn from television.

(4) A mixed group of officers and enlisted men can learn from the same television presentation.

B. Film research indicates that the efficiency of a viewing group is directly influenced by the leadership of the class instructor as well as the effectiveness of the television presentation itself.

HOW HAS TELEVISION BEEN USED IN TRAINING?

A. Television has been used in a number of different ways in both training and education. The following is a partial list of its uses:

(1) Special Devices Center originated presentations:

(a) Audience: Naval Reserve Recruits. Subjects: Shipboard Organization, Boat Handling, Fire Fighting, Manila and Wire Rope, etc. Use: training aid for class instructors.

(b) Audience: Naval Reserve Pilots and Crewmen. Subjects: Aerology, Ordnance and Gunnery, Jet Engines, Navigation, etc. Use: training aid for class instructors.

(c) Audience: Army Reserve Officers and Enlisted Men. Subjects: Planning the Attack, The Logistical Plan, Conducting the Attack, etc. Use: instructor substitute.

(2) Enlisted Department, The Signal School, Fort Monmouth, New Jersey:

(a) Audience: Army Enlisted Men. Subject: Complete course in radio. Use: training aid for class instructor.

(3) Department of Agriculture, Washington, D. C.:

(a) Audience: Farmers and their wives. Subject: Agriculture and home economics. Use: instructor substitute.

(4) Western Reserve University, Cleveland, Ohio:

(a) Audience: adult men and women. Subjects: comparative literature, psychology, physical geography. Use: instructor substitute for college credit courses.

(5) Montclair State Teachers College, Montclair, N. J.:

(a) Audience: college, high school, and grade school students. Subjects: wide variety including art, physics, etc. Use: training aid for class instructor, instructor substitute.

(6) New York Board of Education, New York, New York:

(a) Audience: handicapped children who cannot get to school. Subjects: liberal arts, science, vocational guidance. Use: instructor substitute.

(7) Philadelphia Board of Education, Philadelphia, Pa.:

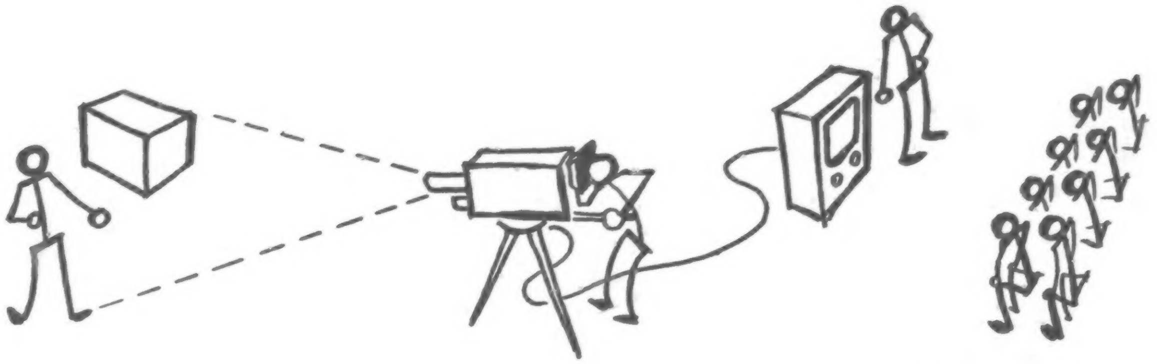
(a) Audience: grade and high school students. Subjects: various, tying indirectly into curriculum. Use: training aid to class instructor.

PART I

WHAT IS TELEVISION?

A. Television can be considered to be a means for the communication of information. Television does not train by itself, and its use does not insure training. It transmits information which may result in training if properly presented at the camera end, and properly used at the receiver end.

B. The complete chain of television communication in training can be described as: Who Says And Shows What, In What Medium, To Whom With What Effect. This can be shown diagrammatically as follows:


Who Says And Shows What
In What Medium
To Whom With What Effect

C. Who Says And Shows What: This is normally the television instructor who presents the subject by the use of visual aids and his spoken words. It could also be a student whose performance is being watched by an instructor.

D. In What Medium: The television presentation is picked up by a television camera. The picture and sound are distributed to receivers by cable or broadcast transmitter.

E. To Whom With What Effect: Viewing the receivers is the audience to whom the presentation is directed. This is usually a group of students supervised by a class instructor. The effect of the presentation is the amount learned by the viewers.

WHAT INFORMATION IS TRANSMITTED BY TELEVISION?

A. The content of a television presentation is the "Who Says and Shows What". It consists of pictures (the instructor, equipment, charts, etc.) and sounds (the instructor's voice, equipment operating, etc.). The content can be in the following forms:

(1) Live TV: This consists of actual persons or objects in front of the camera at the time of transmission. These are seen by the viewers on the receiver end at the same time. In live TV, the viewers see action as it is happening, that is, without prior recording.

(2) Film TV: This consists of motion picture film (training films, combat film, etc.) which is transmitted by television. It is seen by the viewers as a TV presentation. In film TV, the viewers see action which has happened some time in the past, and recorded on film for use later.

(3) Combination live and film: This type of presentation can have any proportion of live TV to film. It is generally a basically live TV presentation with film integrated into it.

WHAT ARE THE USES OF TELEVISION IN TRAINING?

A. Television can be used for the transmission of information directed toward:

(1) Orientation: Showing students a task which they will have to perform.

(2) Attitudes: Creation of attitudes such as toward combat or other military situations.

(3) Knowledge: Presentation of information which the students have to learn.

(4) Skills: Demonstration of the performance of skills prior to application by the students.

B. The specific training uses of television can be divided into four groups:

(1) Training Aid: Television presentations can function as an aid to the class instructor in the classroom, laboratory, or in the field. These presentations can be in the form of:

(a) Lectures by a special TV instructor.

(b) Demonstrations by a special TV instructor.

(c) Closeup views of aids or equipment which are better than the students would get with the naked eye.

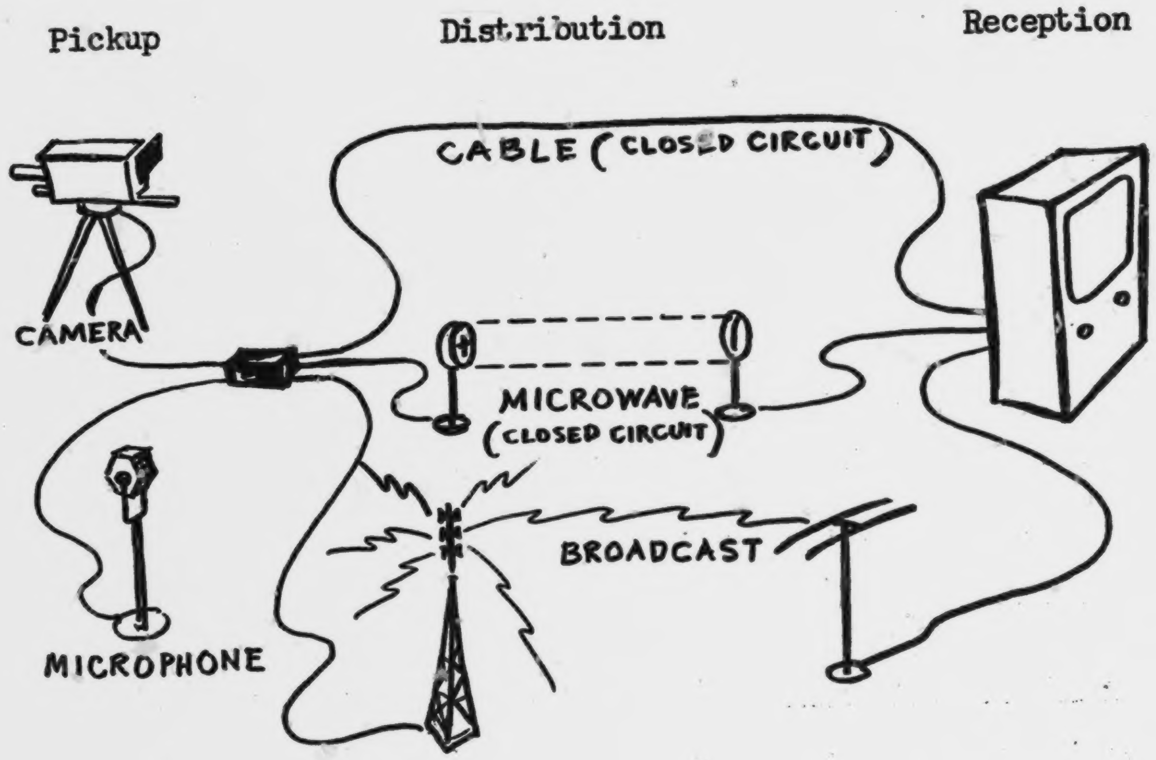
(2) Instructor Substitute: In situations of an emergency nature, or where students cannot be reached otherwise, TV can serve as a substitute for the classroom instructor.

(3) TV as Part of a Training Device: Television can be built into a training device as an organic part. Use might be to provide a visual presentation, or to allow the instructor to monitor student performance.

(4) Kinescope Recording Process: Motion picture films can be produced using the television kinescope recording process. As this is a by-product of television, it will be treated in a separate report.

WHAT EQUIPMENT IS USED IN TELEVISION TRAINING?

A. The equipment requirements for television include pickup, distribution, and reception equipment. Each of these can vary independently of the other. They can be diagrammatically shown as follows:


Pickup
Distribution
Reception
CABLE (CLOSED CIRCUIT)
CAMERA
MICROWAVE (CLOSED CIRCUIT)
BROADCAST
MICROPHONE

B. TV Pickup: This consists of one or more television cameras with control equipment, lighting equipment, and one or more microphones with control equipment. Television pickup usually requires building space.

C. TV Distribution: This usually consists of one of the following, though a combination can be used:

(1) Cable: In this method, the television picture and sound are transmitted through a cable in the same way a telephone wire transmits a conversation. This is called "closed circuit" because only receivers tapping the cable can receive the signal.

(2) Microwave: This method sends the television picture and sound via a directional broadcast. This travels in a tight beam similar to that of a searchlight. It can be received only at the point to which it is directed, and is also in the closed circuit category.

(3) Broadcast: This uses a transmitter similar to commercial television stations. The signal travels in all directions, and can be received by any receiver within range of the transmitter. It is therefore "open circuit". It is expensive, and requires the allocation of a frequency on which to broadcast.

D. TV Reception: One or more standard commercial receivers can be used for viewing. These either tap the cable or microwave terminal, or use a standard TV antenna for broadcast reception.

E. Amount of Equipment: The amount of equipment needed for television training can vary considerably from one training situation to another. This is because the medium is flexible, allowing it to be tailored to fit the specific problem. In general, equipment requirements are based on the needs of the individual training situation in terms of:

(1) Type of Presentation: The amount of pickup equipment is directly influenced by the format, subject matter, training aids used, etc. For example, a TV instructor and blackboard might require only one camera, whereas a dramatic format with complicated aids might require three.

(2) Number of hours per week of Presentations: The amount of pickup equipment also depends on the hours per week of presentations. Beyond a certain point, duplicate equipment is needed to allow time for maintenance and preparation.

(3) Geographical and Physical Layout: This affects the distribution equipment. If pickup is close to reception, cable may be used. Long distance may require microwave or broadcast.

WHAT PERSONNEL ARE USED IN TELEVISION TRAINING?

A. The personnel required for television training may be divided into four types:

(1) Engineering: These are operating and maintenance personnel for pickup, distribution and reception equipment. They are generally specialized television personnel. In a simple situation, non-specialized personnel may operate pickup equipment. Reception equipment normally does not require specialized personnel for operation.

(2) Production: These prepare and produce the television presentations. They are specialized television personnel. They may be advisory only in simple situation or with experienced local personnel.

(3) Instructional: These prepare and present the training material. They may be local instructors in many cases. Specialized personnel are required for complex presentations.

(4) Administrative: These are charged with supervision and administration of television matters. They may be non-specialized personnel.

B. Number of personnel: The number of personnel required for television training also varies considerably from one training situation to another. In general, the number and type of personnel required are based on the needs of the training situation in terms of:

(1) Amount and type of equipment: Engineering personnel requirements vary with either the amount of equipment, or the complexity of equipment. Some simple equipment requires almost no engineering personnel.

(2) Type of presentations: Production and instructional personnel vary with type of presentations. Simple presentations may require no production personnel, and a minimum of instructors. Complex presentations such as dramatic programs may require a number of production personnel and presentation experts (actors, etc.).

(3) Number of hours per week of presentations: The amount of television training will obviously influence the number of all types of personnel.

WHAT ARE IMPORTANT FACTORS IN TELEVISION PRESENTATION?

A. The effectiveness of a television presentation is influenced by the manner in which the content is selected and presented. This area includes the activities of the television instructor, the use of his television training aids or "props", and the manipulation of the cameras. Important factors are:

(1) TV Instructor Qualifications: Experience indicates that both presentation experts (actors, etc.) or subject-matter experts (local instructors, etc.) can perform effectively in television. Presentation experts should look the part of an instructor, and should preferably have some knowledge of the subject. Subject-matter experts should have intimate knowledge of the subject, and should be good instructors.

(2) Training Aid Visibility: Experimental evidence indicates that there is considerable variation in the visibility of training aids on television. Simplicity in layout, white on black, etc. make for good visibility. Aids should be checked by prior viewing them on television where possible.

(3) Readability: Experimental evidence from film research indicates that the understanding of the student for the spoken or written word varies considerably. Understanding can be increased through the use of short sentences, short words, etc.

(4) Format: This is the form of the presentation. Experience indicates that narration is effective. This consists of a narrator, normally not seen by the camera, describing and explaining what is seen. Other formats are: lecture, demonstration, panel, and dramatic.

(5) Lack of "Slickness": Experience in television and research in film indicate that presentations can be effective in training with a minimum of commercial "slickness". Minor defects in picture quality and errors in timing are apparently not too important.

PART II

WHAT SYSTEMS OF TELEVISION MAY BE USED IN TRAINING?

A. Equipment Combinations: It is convenient to consider television as being divided into a number of "systems", or combinations of television equipments. It can be seen that the potential number of such combinations is very great, as pickup, distribution, and reception can all vary independently. By generalizing and allowing some overlap, it is possible to reduce this number to five systems. These are:

(1) Minimum Requirements Television

(2) Single Station Television

(3) Network Television

(4) Mobile Television

(5) Television as a Part of a Training Device

B. Training Situation: The above types should not be considered to be inflexible. They vary considerably within themselves depending upon the training situation, and can be combined to make other types. Perhaps the most important fact about television equipment is that its combinations are flexible. They should not be predetermined, but should be based upon the requirements of the individual training situation in which they are to be used.

MINIMUM REQUIREMENTS TELEVISION:

A. Description: Minimum requirements television consists of a closed-circuit television system designed to provide effective training with a minimum of equipment and personnel. It is normally limited in coverage to all or part of a post or station. It is important to understand that minimum requirements television is not

like commercial television. It is tailor-made to the training situation, with just the equipment to do the job.
Such a system might consist of one camera, a little cable, and ten receivers. This could provide adequate training for 200 students in a number of situations and could be operated almost entirely by local personnel. Other situations might require more equipment and specialized personnel, but would always be minimum for effective training.

B. Typical Applications: Minimum requirements television can be used for:

(1) TV Presentations: This would consist of lectures or demonstrations by a television instructor for use in the classroom. It could also be used for addresses by the commanding officer, information and education programs, etc.

(2) Remote Viewing: This is television used by the class instructor to provide a group of students with a view of an object or situation. No television instructor would be used. It could be used for viewing an airplane cockpit, surgical operation, ship's engine room, etc.

(3) Monitoring Device: The system can also be used to allow an instructor to monitor student performance.

C. Data for Minimum Requirements Television:

(1) Equipment Requirements:

(a) Pickup: one to three cameras

(b) Distribution: cable and/or microwave

(c) Reception: one receiver per twenty students

(2) Equipment Costs: $8,000 to $150,000. The variation is caused by the amount and type of pickup equipment, the size and type of distribution system, and the number of receivers.

(3) Personnel Requirements:

(a) Engineering: 1 to 15.

(b) Production: 1 to 10.

(c) Instructional: 1 to 20.

(d) Administrative: 1 to 5.

(4) Audience Size: Normally 10 to 1000.

(5) Radius of Operation: Up to three miles with cable, and up to twenty with microwave.

(6) Security: This is good when cable is used, as reception is limited to receivers tied in to cable. Microwave is less secure, though it would require some effort to intercept.

SINGLE STATION TELEVISION:

A. Description: This consists of a single television station, either commercial or a military one of the same type. It broadcasts to any receivers tuned in within an average radius of twenty-five miles.

B. Typical Applications: This system finds its most useful application in civilian education for broadcasting television presentations to home viewers. Military applications under normal conditions would seem limited to broadcasts via commercial television stations to reserve training groups for use as a training aid. It could also be used for extension courses directed to reservists in their homes, or for military public relations, civil defense, etc.

C. Data for Single Station Television:

(1) Equipment requirements:

(a) Pickup: Normally two to ten cameras.

(b) Distribution: Television transmitter with tower.

(c) Reception: Receivers as required.

(2) Equipment Costs: $100,000 to $750,000. If the receivers are not considered, the greatest single item is the transmitter. Variation comes in the number of cameras and receivers, and the transmitter size. Installation and building costs are also important items.

(3) Personnel Requirements:

- (a) Engineering: 8 to 50.
- (b) Production: 5 to 50.
- (c) Instructional: 3 to 20.
- (d) Administrative: 3 to 15.

(4) Audience Size: For practical purposes, 1,000 to 100,000 per station.

(5) Radius of Operation: From 10 to 75 miles, depending upon power of transmitter and height of antennae tower.

(6) Security: There is no security unless scrambling equipment is used. This would probably be very expensive.

(7) Frequency Allocation: It is necessary to obtain allocation of a frequency on which to broadcast.

NETWORK TELEVISION:

A. Description: This consists of a series of television stations, either commercial or military, which are interconnected by a cable and/or microwave facility. The stations are usually grouped in a regional or national basis. Network television stations may be divided into two types:

(1) Originating Stations: These are like single station television. They have all the equipment and personnel necessary for originating their own presentations, either live or film.

(2) Repeater Stations: These stations broadcast presentations received through the network facilities from originating stations. They may also transmit film presentations, as this requires a minimum of additional equipment and personnel. Many commercial television stations have started out this way, and purchased equipment for originating their own live presentations at a later date.

B. Typical Applications: This system of television finds its most useful application in commercial or educational television. Its use would seem limited for military purposes except in national emergencies. It could be used for training directed to reserve groups, to reservists taking extension courses, or for public relations, civil defense, etc.

C. Data for Network Television:

(1) Equipment Requirements:

(a) Originating Stations: Same as single station TV.

(b) Repeater Stations: Transmitter and film pickup equipment.

(c) Interconnection Facility: Existing commercial facilities can be rented, or cable or microwave could be installed.

(2) Equipment Costs:

(a) Originating Station: Same as single station TV.

(b) Repeater Station: $50,000 to $100,000.

(c) Interconnecting Facility: Very high.

(3) Personnel Requirements:

(a) Originating Station: Same as single station TV.

(b) Repeater Station: 5 engineers.

(4) Audience Size: Theoretically unlimited. For practical purposes, it would probably be 1000 to 100,000 per station.

(5) Radius of Operation: From 10 to 75 miles for each station, depending upon power of transmitter and height of antenna tower.

(6) Security: There is no security unless scrambling equipment is used. This would probably be extremely expensive.

(7) Frequency Allocation: It is necessary to obtain allocation of a frequency for each station on which to broadcast.

MOBILE TELEVISION:

A. Description: This is a complete television system (pickup, distribution, and reception) which is capable of moving from one military situation to another. It is housed in vehicles, and can carry its own power supply. It can be used in place of other television systems, or can provide presentations for transmission by other systems.

B. Typical Applications: This system may be used for the same type of training as other systems. It may be used in classrooms, laboratories, or outdoors. It is not tied down to any particular area, and may be moved to where training requirements demand.

C. Data for Mobile Television:

(1) Equipment Requirements:

(a) Pickup: One to three cameras

(b) Distribution: Cable and/or microwave. Cable is for short distance, microwave for long distance.

(c) Reception: One or more receivers.

(d) Power: Portable generators or local power.

(e) Transportation: One to five vehicles.

(2) Equipment Costs: $12,000 to $200,000. There is considerable leeway as regards the elaborateness of the equipment. Variations are caused by number of cameras, additional cost of microwave, amount of cable, number of receivers, amount of power equipment, and number of vehicles.

(3) Personnel Requirements:

(a) Engineering: 2 to 15.

(b) Production: 1 to 10.

(c) Instructional: 1 to 5.

(d) Administrative: 1 to 5.

(4) Audience Size: If operating as an independent system, from 10 to 1000. If feeding another system, then as much as that system has.

(5) Radius of Operation: If operating as an independent system, up to one mile with cable, and up to twenty miles by microwave. If feeding another system, then as much as that system has.

(6) Security: If operating as an independent system, good with cable, fair with microwave. If feeding another system, then as much as that system has.

TELEVISION AS PART OF A TRAINING DEVICE:

A. Description: Television may be built into a training device as a permanent part. It would be used to provide visual information needed by either the student or the instructor in order to obtain effective training.

B. Typical Applications: Little has been done in this field. Television could probably be used for:

(1) Visual presentation: This includes representations of air or ground targets for tracking by gunners, simulated view from aircraft or ship, etc.

(2) Telemetering: This is similar to industrial use, where television provides a remote view of instrument readings, such as in an airplane cockpit, engine room, etc.

(3) Student Performance: This provides the instructor with a view of student performance so that the latter may be corrected when making a mistake.

C. Data for Television as a Part of Training Device:

(1) Equipment Requirements:

(a) Pickup: One or more cameras.

(b) Distribution: Cable.

(c) Reception: One or more receivers.

(2) Equipment Costs: $7,000 and up. Variations depend upon whether standard television equipment is used, or whether special cameras or receivers are required.

(3) Personnel Requirements: Simple equipment might require only one engineer part time for maintenance. Special equipment might require several engineers for operation and maintenance.

(4) Audience Size: One instructor or student to perhaps 500.

(5) Radius of Operation: As required.

(6) Security: This is good as cable is used, limiting reception to receivers tied in to the cable.

PART III

WHAT IS THE PLACE OF TELEVISION IN TRAINING?

A. The place of television in training is yet to be determined, though its use seems to be clearly indicated. The extent of its use will depend on:

(1) The advantages and limitations of television for training purposes. These will determine the general areas of application.

(2) Analyses of the individual training situations where its use is proposed. These will determine the applications to specific training problems.

(3) The problems of integrating television into an already existing training situation. These will determine the speed of acceptance.

B. The national military situation will also influence the use of television in training. A national emergency will provide problems, especially concerning the training of large numbers of personnel in extremely short periods of time.

WHAT ARE THE ADVANTAGES AND LIMITATIONS OF TELEVISION?

A. All communications media and audio-visual materials have their advantages and limitations. Those of television appear to be:

(1) Advantages:

(a) A large and scattered audience may be accommodated simultaneously without prior recording of the presentation.

(b) Shortage or limitations of instructors can be overcome by making a "best" instructor available to large groups without prior recording of his presentation.

(c) Effective and immediate use may be made of training aids or operational equipment which are scarce, expensive, or difficult to move.

(d) Complex training presentations may be changed and kept up to date without rerecording.

(e) Standardization of instruction is possible by providing large and scattered groups of students with the same level of training.

(f) Training for large and scattered groups of students may be prepared under local training control and adapted to local training needs.

(g) Supervisory personnel may check more easily on the quality of instruction by monitoring television presentations from their offices.

(h) Unit cost per student may be kept low for large groups even though initial cost of equipment may be high.

(i) Every student has a front seat. Television magnifies detail and brings it closer.

(2) Limitations:

(a) Initial cost of equipment may be high. This is usually offset by a low cost per trainee.

(b) Specialized personnel are required for maintenance of equipment. They also may be required for operation, production and instruction.

(c) Preview of presentation is difficult for the class instructor.

(d) Two-way communication between TV instructor and student is difficult for large groups. This is common to any instruction to large numbers of students.

(e) The introduction of television may cause some administrative problems, such as rescheduling, etc.

(f) Television cannot show everything equally well. Visibility on some equipment is poor.

(g) Security problems are caused if cable is not used.

(h) Television requires more time for preparation by the TV instructor. This should increase the quality of instruction, however.

(i) Television may be disturbing to marginal instructors by posing a threat to their positions. This is more important in civilian education than military training.

WHEN SHOULD TELEVISION BE USED IN TRAINING?

A. Television can be used in a large number of training situations. It should be used only when it is the "best" method of training. This will obviously depend upon the individual training situation, and reasons for use in one case may differ from those in another.

B. Training Analysis: When the use of television is being considered, an analysis of the individual training situation should be made to furnish a comparison of television with alternative methods. This will provide a basis on which a decision may be made. Factors influencing the decision may be one or a combination of the following:

(1) Quality: Level of instructional effectiveness required.

(2) Quantity: Number of students who have to be trained.

(3) Time: Length of training period.

(4) Space: Problems of movement of students or training aids.

(5) Cost: Funds available.

HOW CAN TELEVISION BE INTEGRATED INTO TRAINING?

A. Integration: This is the process of placing television in an existing training situation. It is important because:

(1) The introduction of television into an existing situation will require at least some changes in procedure, scheduling, curriculum, etc.

(2) The personnel involved will be largely unfamiliar with television, and will have to learn how to use it.

B. Problems of Integration: These can obviously be large or small, depending to a considerable extent on the system of television used, and the extent of use. Assuming that a minimum of disturbance is preferable, the following appear to be important:

(1) Integration should be gradual. This will keep to a minimum the problems of schedule changes, etc.

(2) Television should be introduced on an experimental basis, and should be kept this way for a considerable period of time. This allows for maximum testing and experimentation.

(3) "Educating the educator", as it is called in civilian television, is essential. Personnel responsible for training should have knowledge of the medium.

(4) High level acceptance is necessary to avoid obstacles.

(5) A television policy committee should be formed to direct the use of television in the training situation.

IN WHAT TRAINING SITUATIONS IS THE USE OF TELEVISION INDICATED?

A. The present development of television indicates its potential use in the following military training situations:

(1) Service Schools: Minimum requirements and mobile television appear to have wide application in school situations. Experience is needed to determine the extent to which they can be used.

(2) Field Training: Minimum requirements and mobile television appear to have applications in certain field situations. Experience is also needed to determine the extent to which they can be used.

(3) Reserve Training: Single station television has been effectively used by the Third Naval District in reserve training. It appears to have applications for reserve training.

B. Other applications of television are possible, but cannot be recommended because of lack of experience or experimental evidence. These include fleet training, training for ships in port, etc.